THE

RAILWAY GAZETTE

Price: Two Shillings | FRIDAY, NOVEMBER 17, 1961 | Annually £5 by post

UP GOES 15 TONS

DOWN COME HANDLING COSTS

WITH THE

RAPIER

1520

The RapieR 1520 Mobile Crane—loads up to 15 tons, jibs up to 80 feet—works harder and longer to bring your handling costs down . . . but whatever specification you are looking for in mobile cranes, you will find it in the RapieR range. And every RapieR Crane has the qualities which so quickly established the 1520 as a crane to give operators' profits a big lift . . . high duty capacity, tight-corner manoeuvrability, complete vision, long reach, year-by-year reliability with easy maintenance.

Get full details of the 1520 and a smaller version the 511 from . . .

RANSOMES & RAPIER LTD IPSWICH & LONDON

A Newton Chambers Company

TRADITIONAL PULLMAN LUXURY

BY

METRO-CAMMELL

METROPOLITAN-CAMMELL CARRIAGE & WAGON CO. LTD.

HEAD OFFICE: SALTLEY, BIRMINGHAM 8

LONDON OFFICE: VICKERS HOUSE, BROADWAY, WESTMINSTER, S.W.1

WESTINGHOUSE

BRAKES IN AFRICA

Air, Air/Vacuum and Vacuum Brake Equipment from the Westinghouse factories is extensively used all over the continent of Africa, on passenger and freight stock, steam, electric and diesel locomotives and the illustration shows two of 135 Class 5E1 locomotives supplied by A.E.I. Ltd., now in operation on South African Railways, fitted with Westinghouse Vacuum-Controlled Straight Air Brake Equipment.

Westinghouse Electro-Vacuum Braking is also fitted on the 400 coaches now running on the Cape Western Electrification and on the 349 coaches of the Reef Electrification.

Brakes designed and made in England by:—

Westinghouse Brake and Signal Co. Ltd., 82, York Way, London, N.1

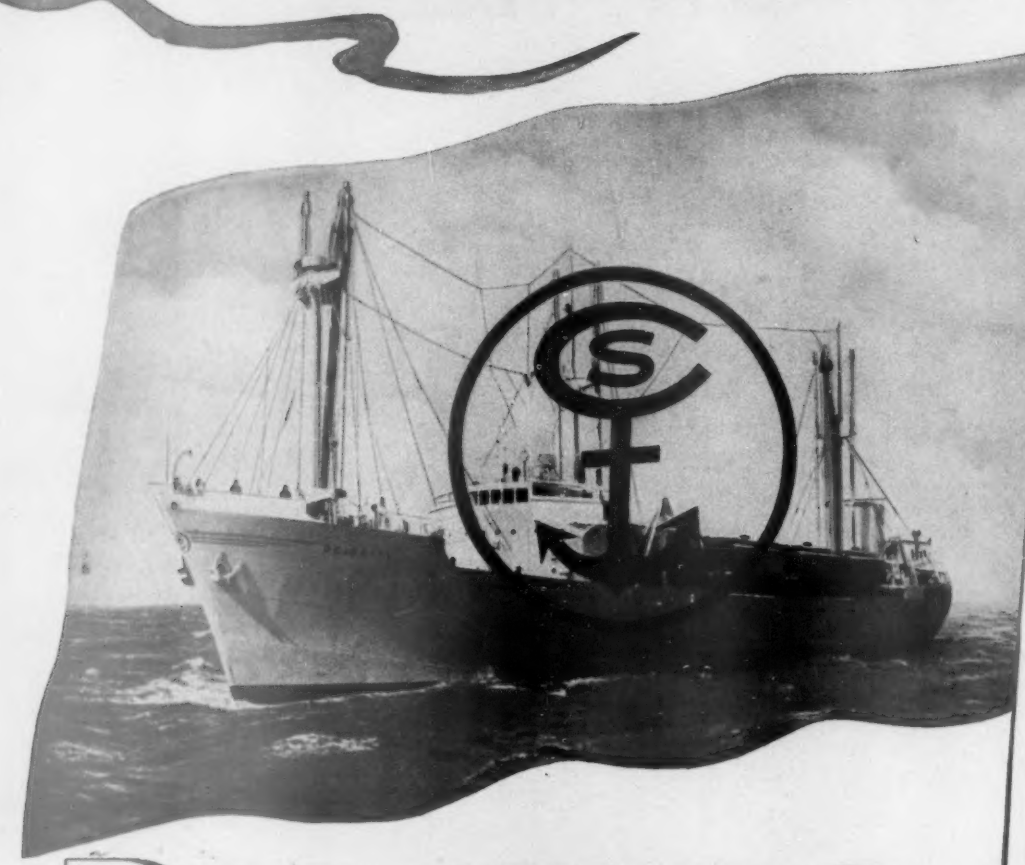
Westinghouse Brake (Australasia) Pty. Ltd., Concord West, N.S.W.

Saxby & Farmer (India) Private Ltd., Calcutta

Westinghouse Brake & Signal Co. S.A. (Pty.) Ltd., Johannesburg. *Agents—Bellamy and Lambie, Johannesburg*

PIONEERS IN

HEAVY-LIFT TRANSPORTATION



BELSHIPS

Over 30 years' specialisation in
the transportation of Railway Rolling Stock
World-wide service
Lifts up to 200 tons

BELSHIPS CO. LTD. SKIBS A/S • OSLO • NORWAY

Managers: CHRISTEN SMITH SHIPPING CO., Haakon VII's Gate 1 • OSLO • NORWAY

London Office: BELSHIPS COMPANY LTD. • Creechurch House • Creechurch Lane • LONDON • E.C.3

FOWLERS
FOR A
BLOOMING
GOOD
STEEL
CASTING

Technical Brochure from

JOHN FOWLER & CO (LEEDS) LTD Sprotborough Foundry, Sprotborough, Doncaster

TOWN

GIRDER RADIAL DRILLING MACHINES

MODELS E.G.4 and E.G.8:
RADIAL DRILLING MACHINES
(for Girders, Plates, Structural Parts, etc.)

Each model in five sizes: 4′, 5′, 6′, 7′, 8′:
(E.G.4) 4 speeds: 160—600 r.p.m.
(E.G.8) 8 speeds: 20—500 r.p.m.

Drills up to 2″ from solid in mild steel.

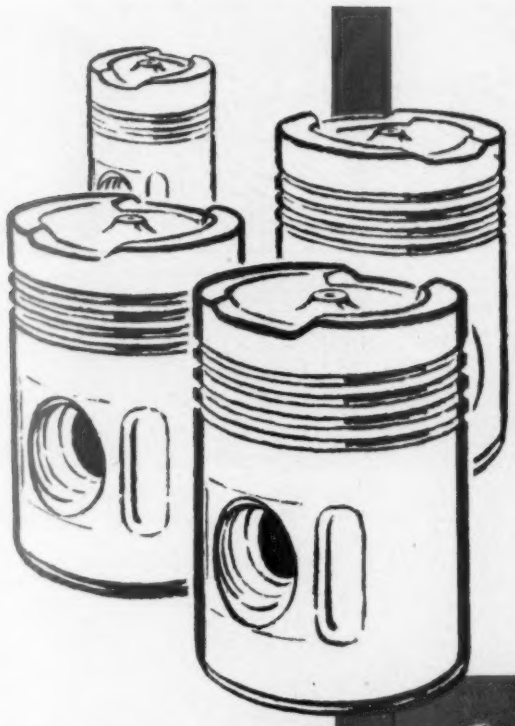
Also made with single speed.

Wide range of other models manufactured.

Write for leaflet "Go to Town."

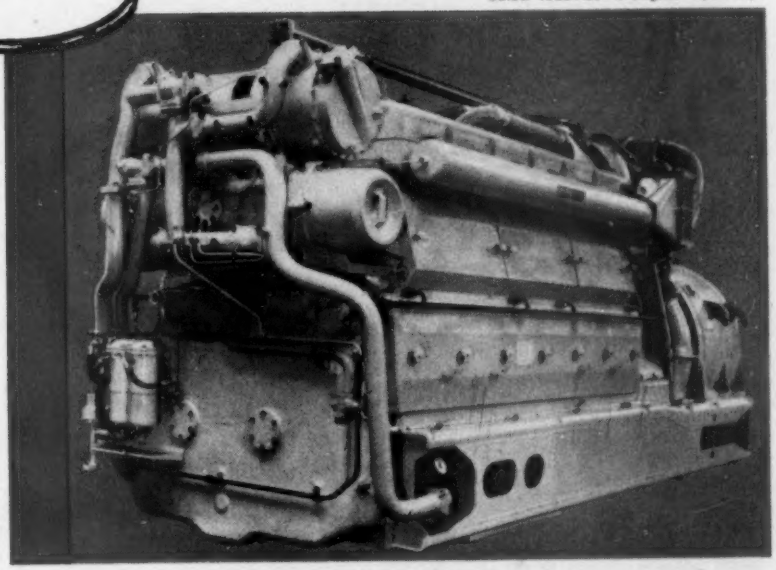
FRED^K. TOWN & SONS LTD | **HALIFAX · YORKS**
MAKERS OF HIGH-CLASS DRILLING MACHINES FOR 58 YEARS
PHONE: HALIFAX 60373/4

T22



Duralumin pistons make engines light hearted

Sulzer 12LDA28—B engine—2,500 h.p.



Vickers-Armstrongs (Engineers) Ltd are using Duralumin 'J' to make the pistons for the Sulzer engines which are being incorporated in the new diesels on British Railways. Vickers chose 'Duralumin' because it combines high strength with light weight. These pistons are being produced in the James Booth Forging Department which houses the 12,000-ton forging press capable of producing large forgings up to a weight of 3 tons.

Consider the use of light alloy forgings in your business—you will find the James Booth service refreshingly helpful.

DURALUMIN

REGD. TRADE MARK

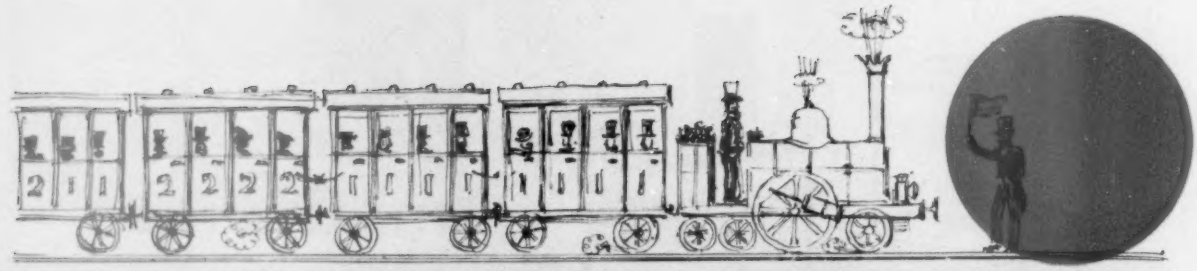
JAMES BOOTH

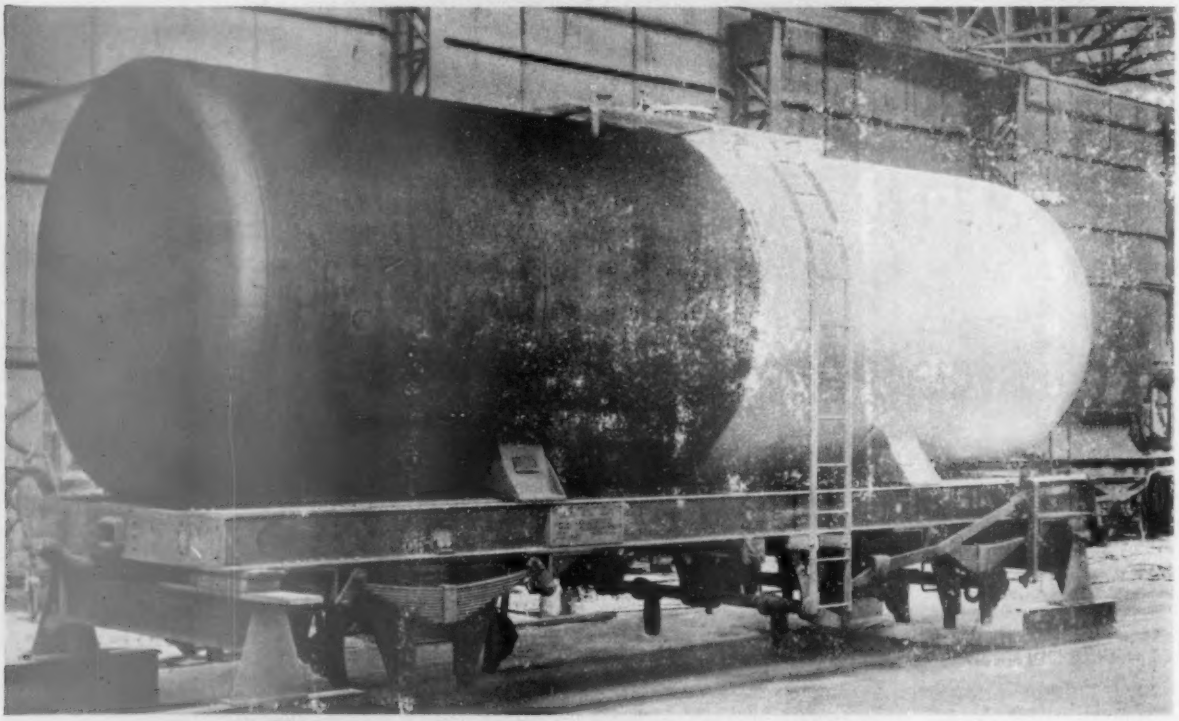
JAMES BOOTH ALUMINIUM LIMITED · KITTS GREEN · BIRMINGHAM 33 · Tel STEchford 4020

ALUMINIUM

EXTRUSIONS · LARGE FORGINGS · PLATE · SHEET · STRIP AND TUBES IN INFINITE VARIETY

JBA /RG 361





BRITISH RAILWAY TRAFFIC AND
ELECTRIC CO. LTD., TANK CAR,
OPERATED BY ESSO PETROLEUM CO., LTD.
GRIT BLASTED BY
SOUTH STAFFS WAGON CO., LTD.
BLOWER GREEN, DUDLEY

STOP WASTAGE BY CORROSION

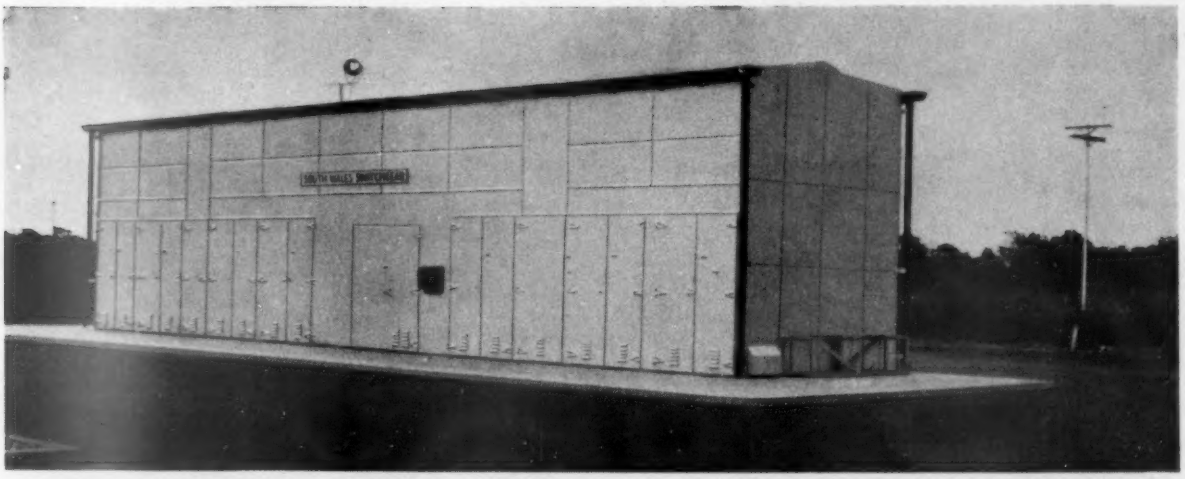
REMOVE THE CORROSION BOGEY AND IMPROVE THE APPEARANCE OF YOUR TRAFFIC WITH

VACU-BLAST

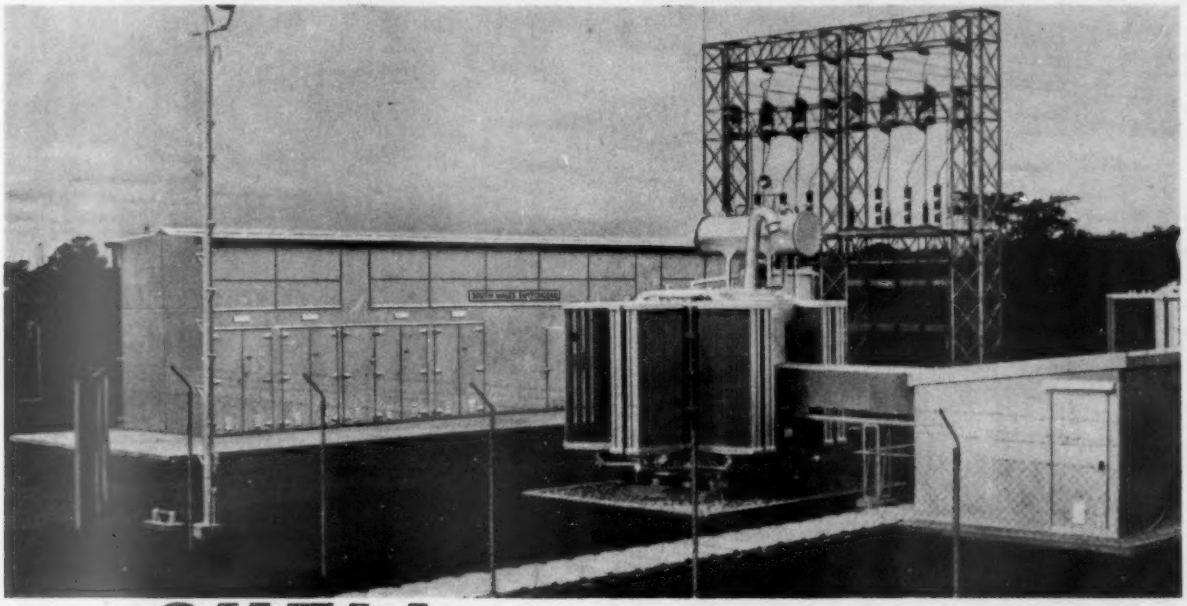
VACU-BLAST REMOVES OLD PAINT AND CORROSION AND GIVES A GOOD START TO YOUR PAINT AND ASSURES A PERFECT LASTING FINISH.

VACU-BLAST LIMITED

WELLCROFT ROAD · SLOUGH · **BUCKS**
Telephone: SLOUGH 24507/9



SOUTH WALES SWITCHGEAR



for *SHELL* at Lake Maracaibo

Above are shown installations of the type U.E.1. air-insulated package switchgear, for service at 34.5kV, at Lake Maracaibo where six switchboards were erected under the supervision of S.W.S. engineers, as part of a major contract, for Cia Shell de Venezuela. The switchboards are completely self-contained with built-in control-rooms and comprise a total of 45 panels.

Safety in service, even in conditions of high ambient temperatures and humidity, ease of erection, economy in initial cost, and the considerable saving in preparation costs have commended this switch unit to its users in many parts of the world.

WRITE FOR CATALOGUE LEAFLET NO. 60.

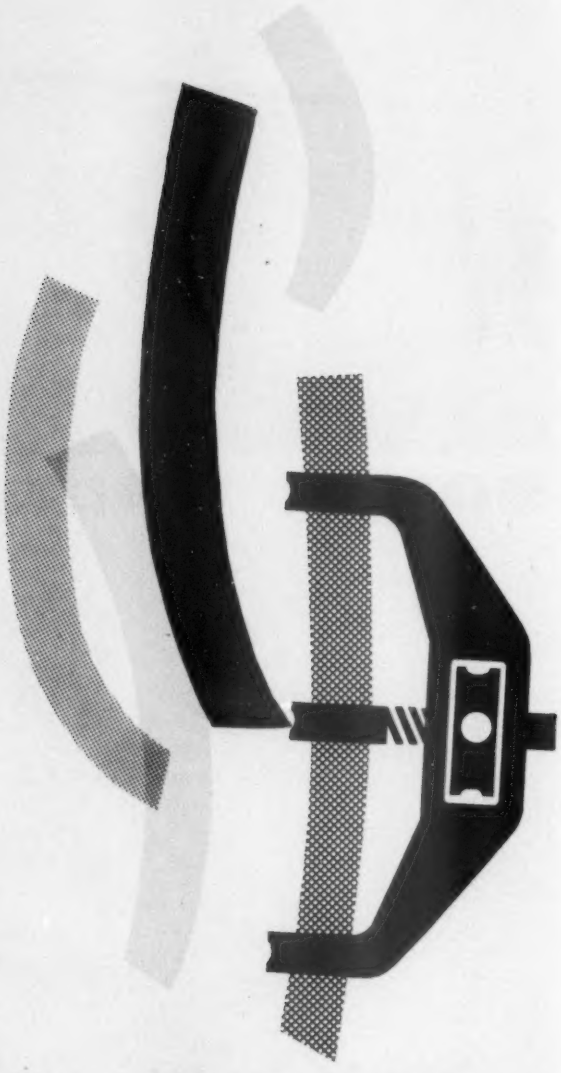
SOUTH WALES SWITCHGEAR LIMITED

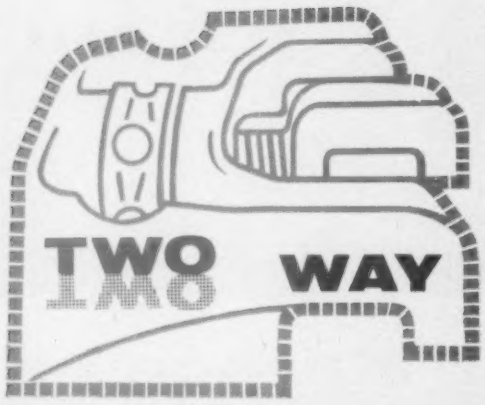
A MEMBER OF THE ABERDARE GROUP OF COMPANIES

BLACKWOOD, MON. WORKS: TREFOREST, BLACKWOOD, ABERBARGOED

SW 39

P&M
Track
Appliances . . .





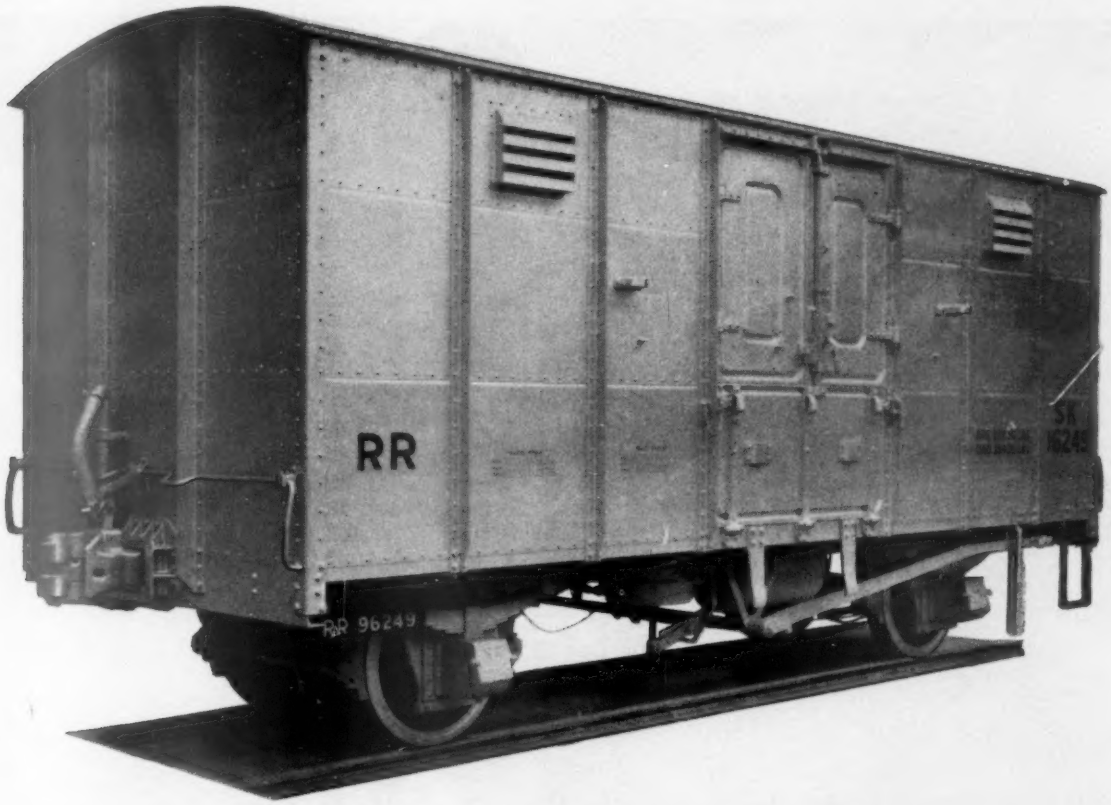
RAIL BENDER

Cast steel for uniform strength
Girder Section for stiffness
Roller Bearings to reduce effort.
Two-way Action for convenience
and adaptability

Model CS 100 for all rails up to 110 lb/yd.
Model CS 80 for F.B. rails up to 80 lb/yd.
and all B.H. sections

P&M The P&M Co. (England) Ltd. 1A GROSVENOR GARDENS LONDON S.W.1

PM/RB62/RG



Axleboxes and Steel Castings

Covered Wagon for the Rhodesia Railways built by Charles Roberts & Co. Ltd., Wakefield, with Axleboxes and Steel Castings supplied by us.

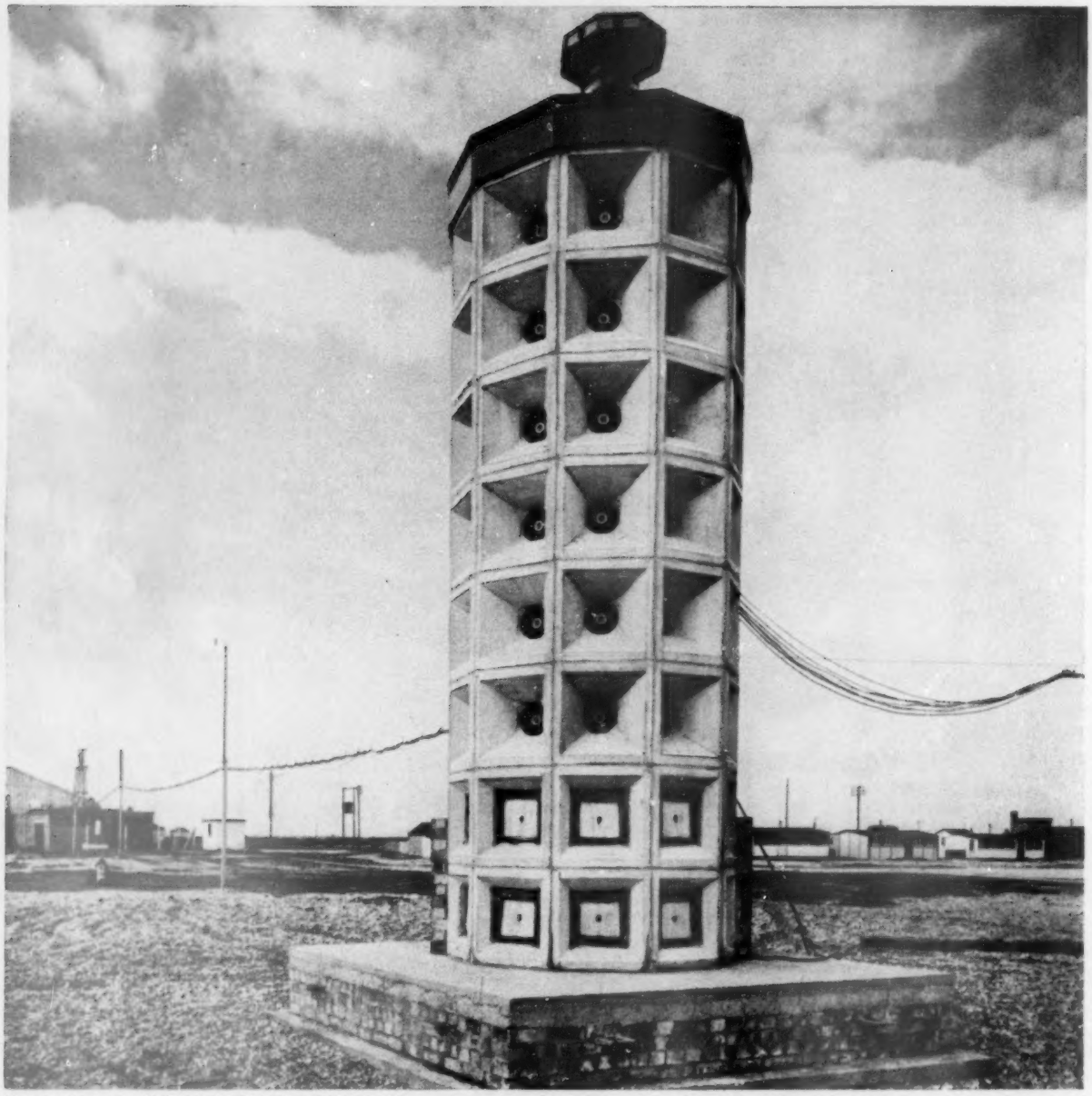
ROBERT HYDE CASTINGS

NORTH STAFFORD STEEL FOUNDRY • STOKE-ON-TRENT

Tel.: 44261-2

CLARENDON WORKS • CHESTERFIELD • *Tel.: 3181-2*

LONDON OFFICE: 10 IDDESLEIGH HOUSE, CAXTON STREET, S.W.1. Tel.: Abbey 4626



Photograph: courtesy of "British Communications and Electronics"

Among the latest means of increasing the safety of shipping, Trinity House has adopted electronically operated horns to warn seamen in fog.
DOCKERS' PAINTS have protected vehicles and buildings on the transport systems of the world in all weathers for over 70 years.

HAVE YOU A PROBLEM OF PROTECTION?
Technicians at our Research Laboratories will advise you on any aspect of paint technology, including the choice and methods of application of DOCKERS' PAINTS.

Protection

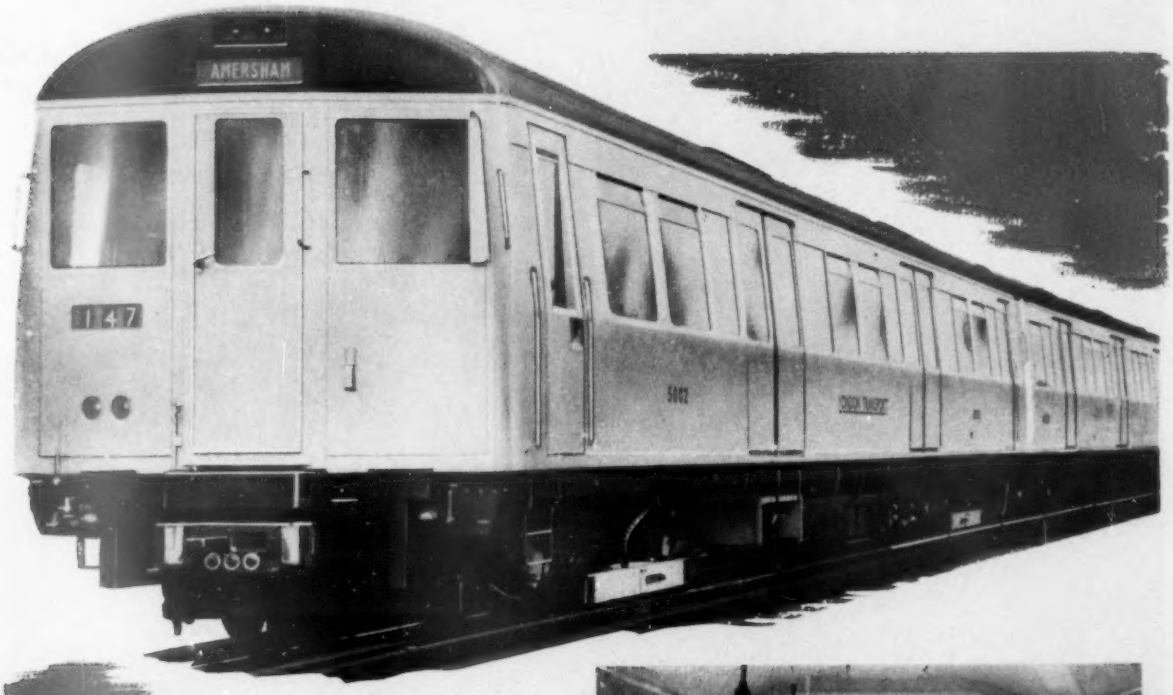
DOCKERS' PAINTS

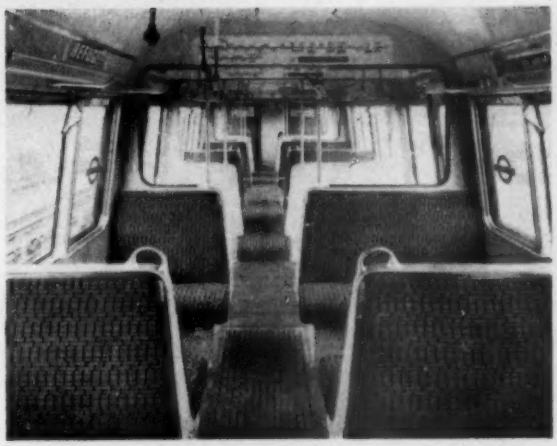
Tested by Time in every Country under the Sun

Docker Brothers · Ladywood · Birmingham 16 · England
Makers of Paints, Lacquers and Varnishes for Every Purpose

LONDON TRANSPORT

LIGHT ALLOY ROLLING STOCK





464 Electric Cars of light alloy construction for service on the Metropolitan Line of the London Transport Executive are now being built

by

GRAVENS LTD.

ARCHITECTS FOR PASSENGER AND FREIGHT STOCK

OF SHEFFIELD ENGLAND

This is the first of twenty-five diesel-electric locomotives (Type 2-1250 h.p.) built at the Darlington Works of British Railways

Power EQUIPMENT FOR BRITAIN'S NEW LOCOMOTIVES

All power equipment for these new British Railways locomotives, including the Sulzer diesel engines, was supplied by AEI, as well as the power equipment for a previous 151 Type 2 1160 h.p. locomotives.

For further details, write to AEI Traction Division, Trafford Park, Manchester 17 or to your local AEI office

AEI

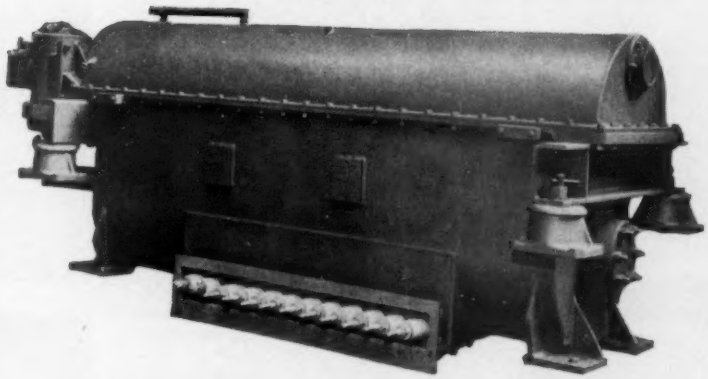
Associated Electrical Industries Ltd
Traction Division
MANCHESTER AND LONDON

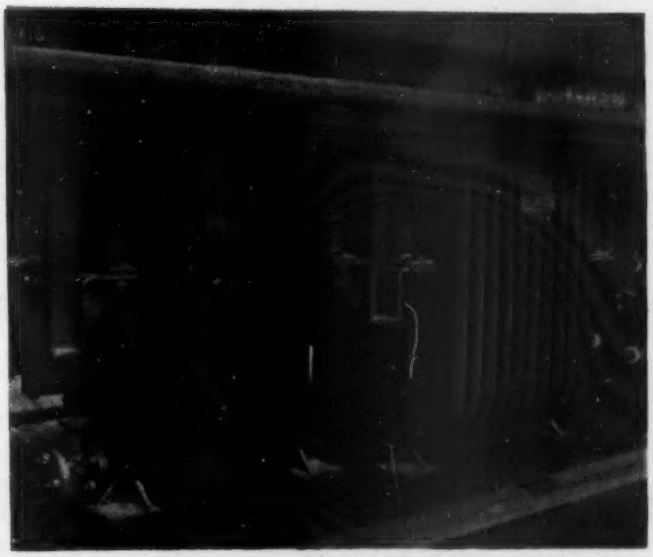
K/T 105

SILENTBLOC mountings in new B.R. electric stock

The multi-unit motor coach illustrated is one of a group of 71 such units built at York and Doncaster with electrical equipment by the General Electric Company Ltd.

The G.E.C. 1,000 kVA transformer and two reactors (as shown here) are carried on Silentbloc anti-vibration mountings. These motor coaches provide the power for 3 or 4 coach multiple-unit trains on the Eastern Region Suburban lines.





SILENTBLOC

ANTI-VIBRATION MOUNTINGS

Come to us at the drawing-board stage!

SILENTBLOC LIMITED
MANOR ROYAL CRAWLEY SUSSEX

Telephone: Crawley 27733 Telegrams: Silentbloc Crawley

Andre Rubber Co. Ltd. is another Silentbloc Company. Silentbloc products are also manufactured by Silentbloc (Australia) Pty. Ltd., Melbourne.

Broadway 5106

IF...

you have a PRESSING need...

Tangye Hydraulic Presses satisfy the need for high-tonnage assembly, metal forming, bending, straightening, and a wide variety of jobs. There is a basic Tangye design suitable for every need and the final press is tailored to meet customers' exact requirements.

...a WEIGHTY PROBLEM...

Tremendous weights are raised or moved by means of hydraulic power which is both powerful and easily and precisely controlled. Expert advice and complete equipment design (essential to the success of any scheme) is provided by Tangyes.

...or require POWER in hand...

Quickly available and readily portable power is provided by the range of Tangye "Hydralite" Jacks. These are available in a range of capacities up to 100 tons and the majority can be carried quite easily by one man.

You should call in

Tangye HYDRAULIC POWER

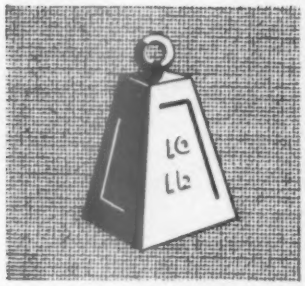
TANGYES LIMITED, CORNWALL WORKS, SMETHWICK, BIRMINGHAM. *Telephone:* **SME 1181**

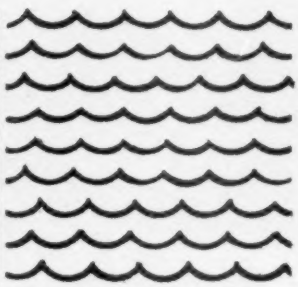
LONDON OFFICE: 11 Grosvenor Hill, W.1. *Telephone:* MAY 1337-8-9. GLASGOW OFFICE: 12 Waterloo Street, C.2. *Telephone:* CEN 6368.
MANCHESTER OFFICE: 465 Chester Road, Old Trafford, Manchester 16. *Telephone:* Trafford Park 3678.

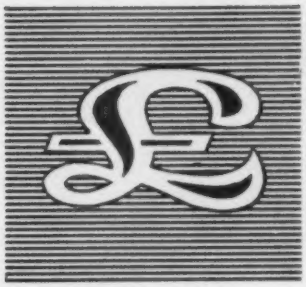
AGENTS THROUGHOUT THE WORLD.

WW61

SAVE

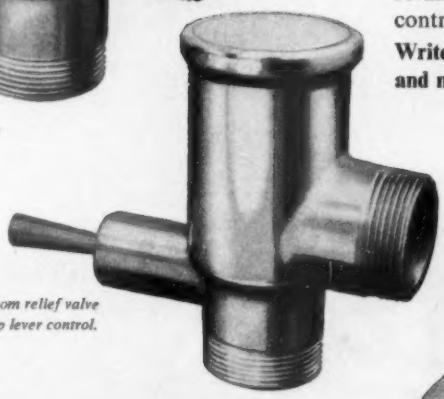






weight · water · space · cost!

Mushroom relief valve with push button control.



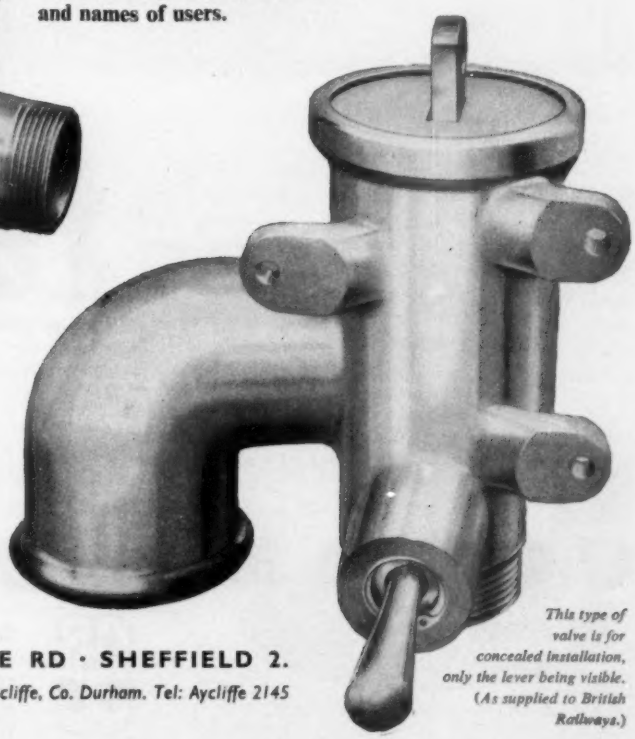
Mushroom relief valve with trip lever control.

Neat, light and space-saving, Wild Lavatory Flushing Valves operate at maximum efficiency with the minimum use of water. The prescribed amount of water for flushing—it can vary from ½ to 2 gallons—is strictly regulated and the valves will function satisfactorily down to a 3 ft. head of water.

The trouble-free operation of these valves is determined by basically simple design, ensuring positive re-seating and instantaneous action. This same simplicity eliminates the need for small bye-passes so there is no risk of clogging.

Available with trip lever or push button control as illustrated.

Write for explanatory literature and names of users.



This type of valve is for concealed installation, only the lever being visible. (As supplied to British Railways.)

FLUSHING VALVES by WILD

A. G. WILD & CO LTD · CHARLOTTE RD · SHEFFIELD 2.

and at Aycliffe Trading Estate, Aycliffe, Co. Durham. Tel: Aycliffe 2145

AW.145

Cowans Sheldon 250 Ton Diesel Railway Breakdown crane

There's BIG capacity for hard work in this Cowans, Sheldon 250 Ton Diesel-Hydraulic Breakdown Crane. This, the largest railway crane to come out of Great Britain, was completed in 9 months, and together with a smaller 150 ton version, is for the Quebec Cartier Mining Company. For reliable Cranes of all types, and for speedy delivery, consult Cowans Sheldon, the Crane Specialists.

DIESEL AND STEAM BREAKDOWN CRANES
HEAVY RAILWAY WORKSHOP EQUIPMENT
DOCKSIDE AND SHIPYARD CRANES

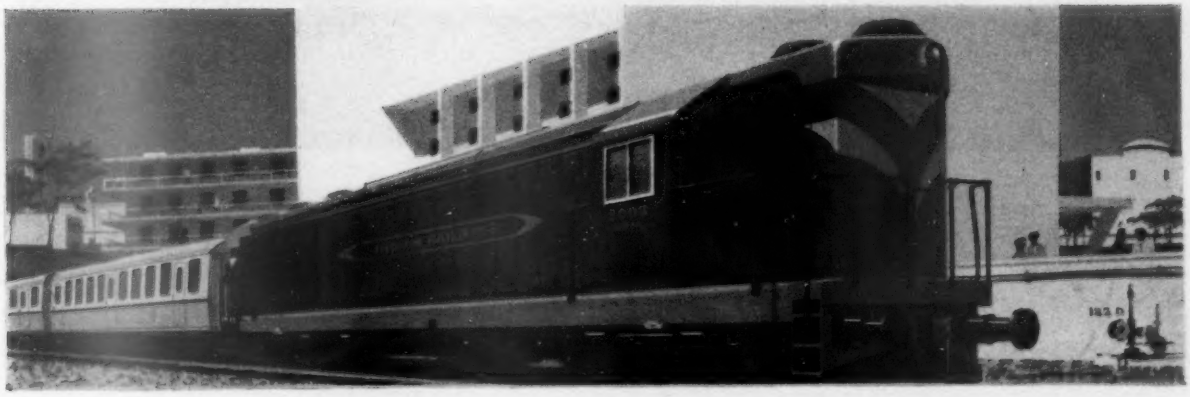
COWANS SHELDON

COWANS, SHELDON & CO. LTD.,
CARLISLE · ENGLAND
TELEPHONE: CARLISLE 24196-9
LONDON OFFICE: AFRICA HOUSE, KINGSWAY, W.C.2
TELEPHONE: HOLBORN 0268

PS7428

Indian Railways purchase 70

GENERAL MOTORS LOCOMOTIVES



Deliveries will begin this year on the first General Motors Diesel-Electric locomotives to go to India—70 units built to meet Indian Railway specifications.

Forty Model GT16, 2,600/2,400 h.p., broad-gauge locomotives have been ordered for the Northern Railway. Largest, most powerful General Motors locomotives ever offered overseas, these units will be based at Moghal Sarai and will be used in time freight operations hauling heavy goods trains.

Thirty Model GA12 meter-gauge locomotives will be delivered to the North-east Frontier Railway and will be maintained at Siliguri. These 1,240/1,150 h.p. locomotives, rated to insure 1,150 h.p. under site conditions for tractive purpose, will also be used to handle increasing goods traffic. Equipped with 1-B-B-1 wheel arrangement, they have a 12-ton axle load and will provide excellent riding characteristics as well as reduced rail stresses with less rail and flange wear.

Addition of India to our honour roll of customers brings the number of countries where General Motors locomotives operate to a total of 38. Throughout the world GM locomotives have established unparalleled records for high tonnage operation at lowest cost. Whether the need is for one locomotive or a fleet, railways can count upon the complete co-operation of the world's most experienced builder of Diesel motive power. Your inquiry will receive prompt attention.

GENERAL MOTORS OVERSEAS OPERATIONS

Division of General Motors Corporation, New York 19, N.Y., U.S.A. Cable Address: Autoexport

ASSOCIATE BUILDERS: AUSTRALIA—The Clyde Engineering Co. Pty., Ltd., Sydney, N.S.W. BELGIUM—LaBrugeoise et Nivelles, St. Michel-lez-Bruges • GERMANY—Henschel-Werke, GmbH, Kassel • SOUTH AFRICA—Union Carriage & Wagon Co. (Pty.) Ltd., Nigel, Transvaal SPAIN—Material y Construcciones, S.A., Barcelona • SWEDEN—Nydqvist & Holm Aktiebolag, Trollhattan

LOCOMOTIVE PLANTS: Electro-Motive Division of General Motors, La Grange, Illinois, U.S.A. General Motors Diesel Limited, London, Ontario, Canada

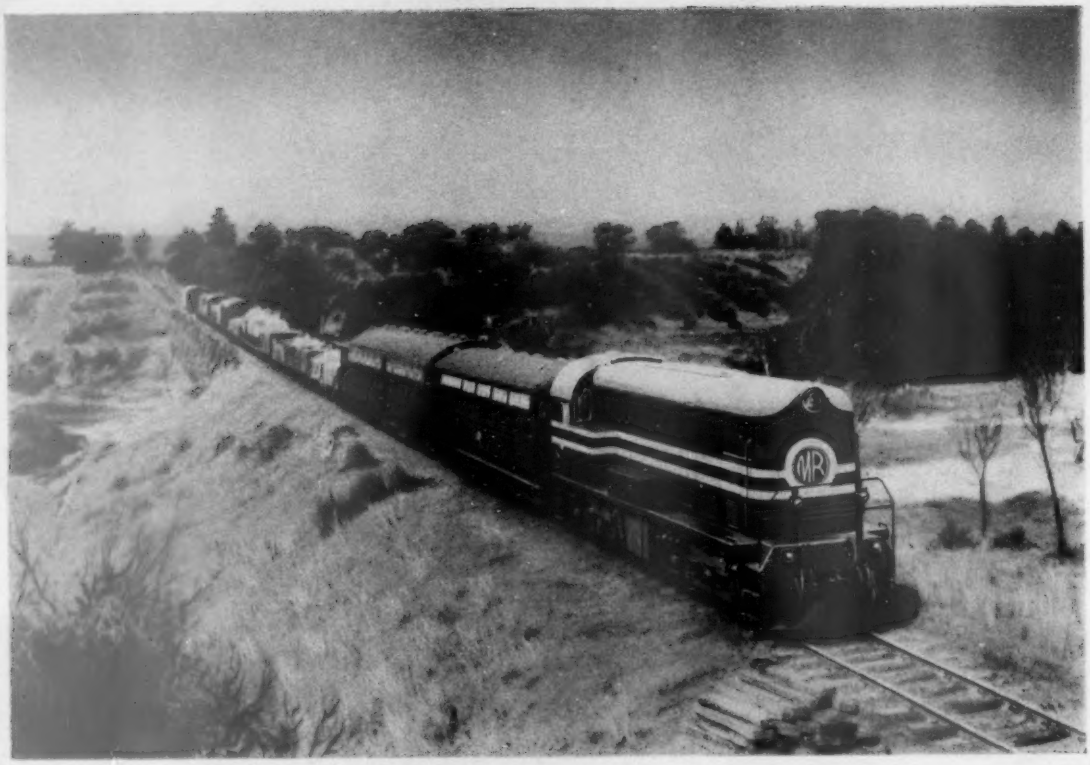
General Motors subsidiaries, branches or representation throughout the world

GM DIESEL POWER

GENERAL MOTORS LOCOMOTIVES

World's Highest Standard – 270 to 2600 H.P.

B



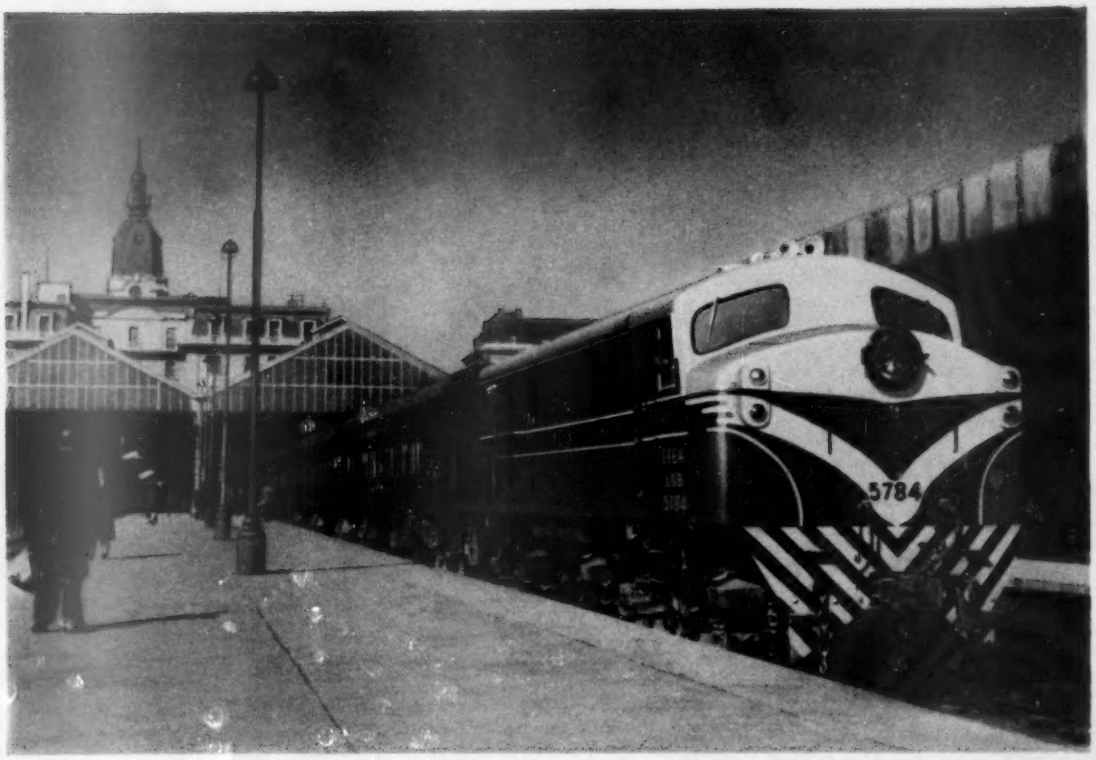
Seven 790 h.p. diesel-electric locomotives have been supplied by 'ENGLISH ELECTRIC' for use on the Midland Railway of Western Australia. The mechanical parts of the locomotives were designed and built by 'ENGLISH ELECTRIC' in Australia.

'ENGLISH ELECTRIC' diesel-electric locomotives are in operation throughout the world. On all duties, including intensive

'ENGLISH

in association with: VULCAN FOUNDRY

TDD 85



Twenty-one of these 'ENGLISH ELECTRIC' 1,000 h.p. general purpose diesel-electric locomotives are in service with the General Belgrano Railway, Argentine. Similar locomotives are also in service in Brazil.

suburban services as in the Argentine and mixed traffic work in Australia, they are well known for trouble-free working.

ELECTRIC'

ROBERT STEPHENSON & HAWTHORNS

for every type of locomotive

for ALL operating conditions

In the interests of rail safety, designers of all new locomotives, rail-cars and electric motor coaches, should remember the positive reliable sweep given by TRICO heavy duty window wipers.

Higher speeds . . . more exacting requirements . . . means drivers must have the confidence which clear vision . . . TRICO vision . . . provides even under the worst possible conditions.

Let our experience gained throughout the world assist you in your designs. Our engineers are always ready to call upon you for consultation.

be safe . . . right from the start with

TRICO WINDOW WIPING EQUIPMENT AND TWO-TONE WARNING HORNS

TRICO-FOLBERTH LIMITED • GREAT WEST ROAD • BRENTFORD • MIDDLESEX • Phone: Isleworth 5111

Smee's TF107A

—all answered simply and quickly by

STC ARRIVAL & DEPARTURE INDICATORS

* Simultaneous displays on concourses, platforms, stairways and in entrance halls and refreshment rooms.

* Indication by stencil, rotary electro-mechanical or multi-light 'News-sign' types of display.

* Operation can be train actuated, entirely automatic, in conjunction with train describers, punched card operated or by simple manual switching.

* Indicators are available as individual display units or complete automatic systems.

Rotary electro-mechanical type indicator at Brussels Gare Centrale. Up to 48 place names can be accommodated for display on each destination panel. This model also incorporates a remote controlled display of train departure time.

Stencil type platform indicator at Queen Street, Glasgow. The display is at present punched-card controlled but is designed to operate, later, in conjunction with the train describer at the adjacent High Street signal box.

Write for full details to:

Standard Telephones and Cables Limited

INSTRUMENTATION AND CONTROL DIVISION

BURLEIGH HOUSE · GREAT CAMBRIDGE ROAD · ENFIELD · MIDDLESEX

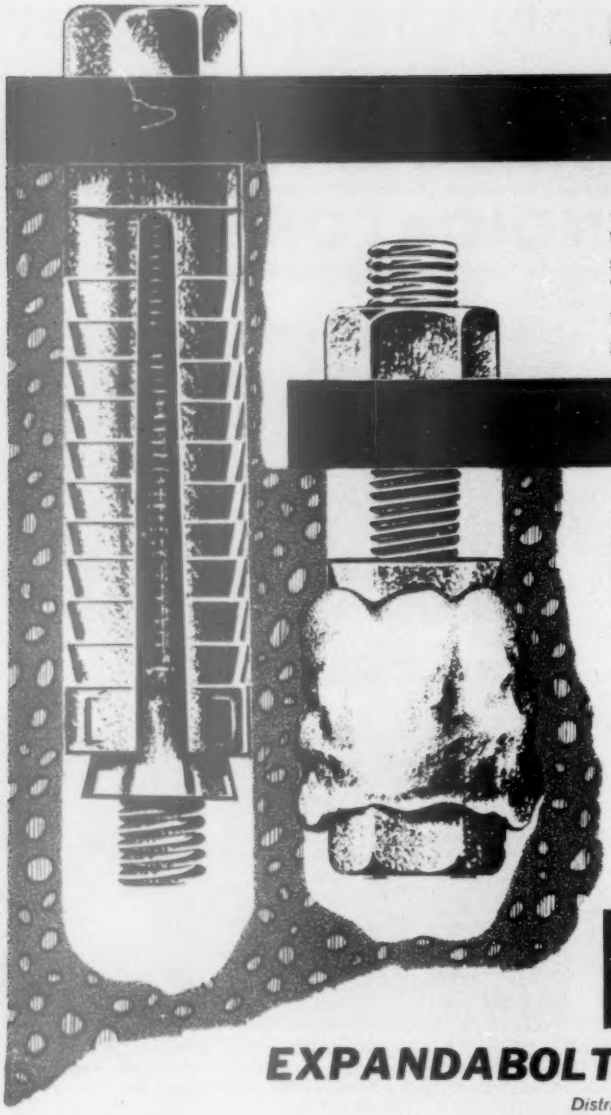
61/9R

C

A SECURE ANCHORAGE

Where a heavy article must be positioned before it is bolted to concrete, brickwork or masonry – use Expandabolts. If the machinery or equipment can be placed over a bolt previously fixed–choose Anchor Bolts.
Both these simple fixing devices provide a secure anchorage which remains firm under movement.

AND HERE'S HOW THEY WORK!



EXPANDABOLTS

A hole is made and the complete bolt (set screw, saw-toothed split-sleeve and cone wedge) is placed in it. The set screw is removed and the article placed in position. The set screw is reinserted and tightened. This draws the wedge into the split-sleeve, forcing the saw-teeth to grip the concrete.

ANCHOR BOLTS

A hole is made, the bolt is inserted and the wedge is driven into the lead spreader, thus locking the bolt in position. The article to be fixed is then placed over the protruding bolt, and the nut is tightened.

philplug

EXPANDABOLTS AND ANCHOR BOLTS

Regd. MISTER PHILPLUG Trade Mark

Distributed by :
EXPANDITE LIMITED, CHASE ROAD, LONDON, N.W.10
Telephone: ELGar 4321 (10 lines) ELGar 1551 (10 lines) Telex 25420
Trafford Park Road, Manchester 17 Telephone: Trafford Park 1285/6
36 Great North Road, Newcastle-upon-Tyne 2
Telephone: Newcastle 23992
EXPANDITE (IRELAND) LIMITED
Greenhills Road, Walkinstown, Dublin Telephone: 501512

ASSOCIATES AND DISTRIBUTORS THROUGHOUT THE WORLD

GROUP FOR STUDY AND ELECTRIFICATION OF RAILWAYS AT SINGLE-PHASE 50 cs

GROUPEMENT D'ETUDE ET D'ELECTRIFICATION DE CHEMINS DE FER EN MONOPHASE 50 Hz

ARBEITSGEMEINSCHAFT FÜR PLANUNG UND DURCHFÜHRUNG VON 50 Hz-BAHNELEKTRIFIZIERUNGEN

comprising the firms

ACEC
AEG
ALSTHOM
BROWN BOVERI
JEUMONT
OERLIKON
SCHNEIDER-WESTINGHOUSE
SIEMENS-SCHUCKERTWERKE

SECRETARY'S OFFICE:
Secrétariat Groupement Electrification
Zürich 1 (Switzerland), Löwenstrasse 31, P.O.B. 605

GROUP's Scope of Activity in 50 cs A.C. Railway Electrification:

Locomotives · Motor-Coaches · Multiple Units · Substations · Overhead Lines
Signalling and Telecommunication Equipment
Studies on Electrification Schemes

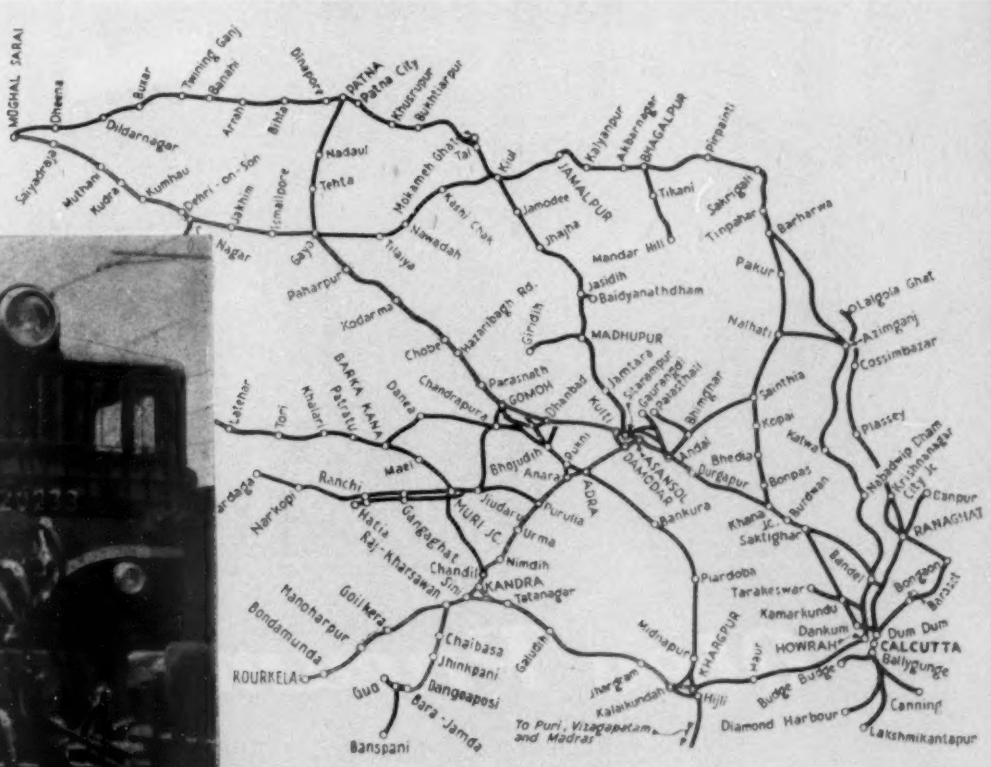
The GROUP supplied for the first stage of the 50 cs a.c. electrification of the

INDIAN RAILWAYS

(Eastern and South Eastern Railways)

100 Bo'Bo' Electric Mixed Traffic Ignitron Locomotives Class $\frac{BBM}{1}$ 20 200

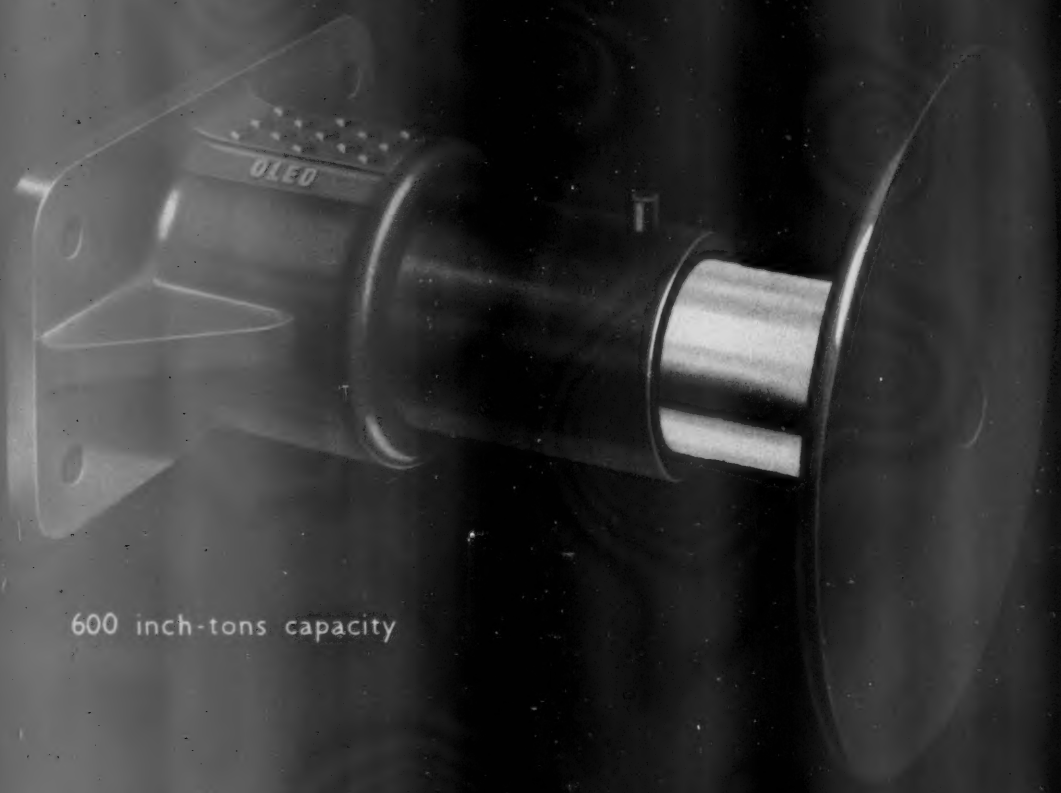
In cooperation with
the locomotive works
BRUGEOISE et NIVELLES
KRAUSS-MAFFEI
FRIED. KRUPP
SFAC (Usines Schneider)



Cont. rating: 2900 HP
Max. speed: 70 mph
Max. starting tractive effort: 26 200 kg

Z 59a / 57003

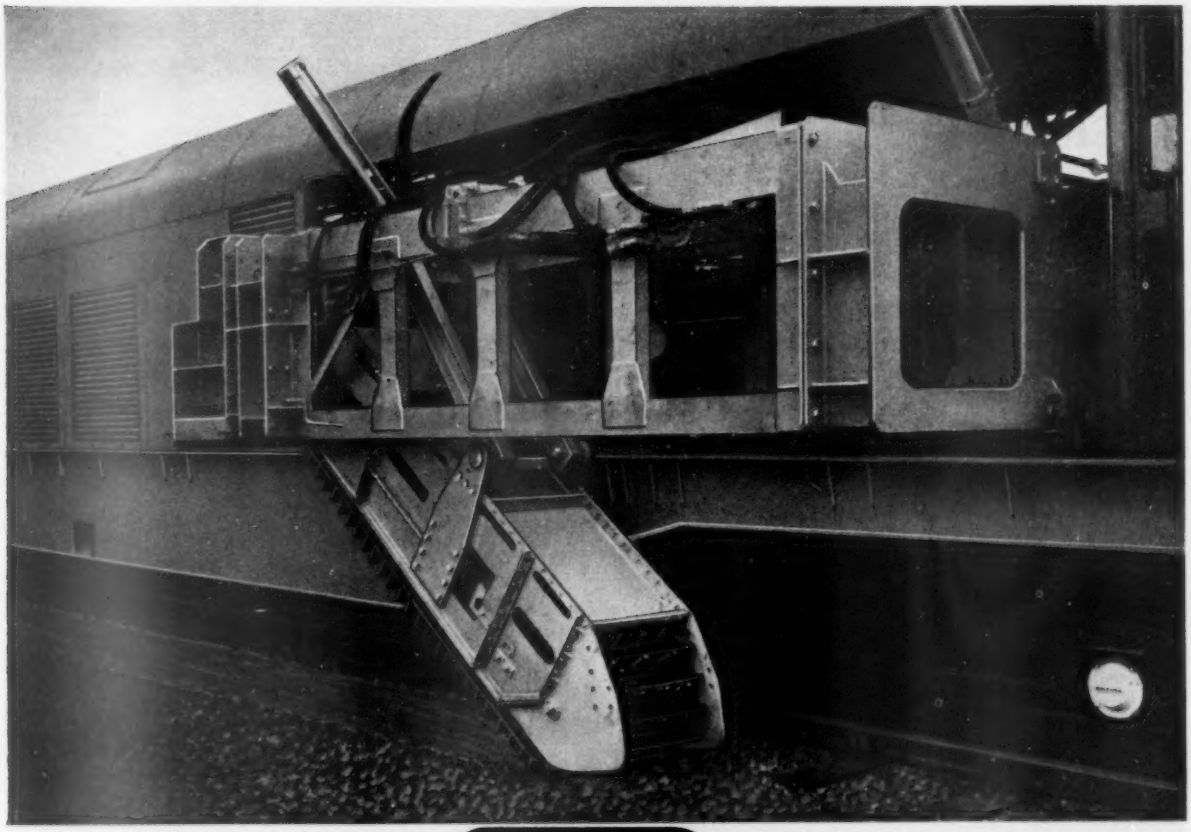
Dependable Hydraulic Buffers
Pioneered by **Oleo**



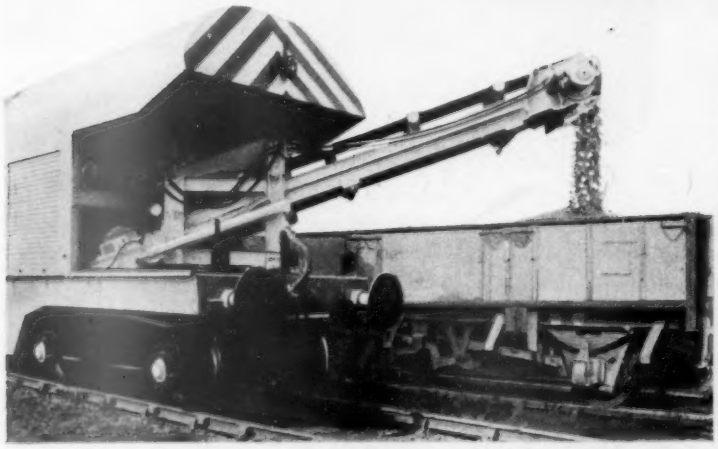
600 inch-tons capacity

Oleo Pneumatics Ltd

KENILWORTH · ENGLAND



Introducing the **HUNSLET** SIX FOOT and SHOULDER BALLAST cleaning machine



The Hunslet Ballast Cleaning Machine cleans the ballast in the shoulder and the six-foot at operating speeds up to **600 yards per hour**, during which time it can deal with 300 tons of stone ballast. Two digging heads are provided, one on each side of the machine, which can be individually controlled for speed of digging, depth of cut and so on. The heads are completely retractable within the body of the machine for travelling.

It is a diesel powered vehicle capable of travelling from stabling point to working site under its own power.

Send for full technical details of this new Hunslet product.

THE HUNSLET ENGINE CO. LTD.
LEEDS 10

ONE OF THE HUNSLET GROUP OF COMPANIES

London Office:
LOCOMOTIVE HOUSE, BUCKINGHAM GATE, S.W.1

Associated Companies:
Hunslet Taylor Consolidated (Pty) Ltd., P.O. Box 57, Cleveland, Transvaal.
Hunslet Engineering Central Africa (Pvt) Ltd., P.O. Box 2581, Salisbury S. Rhodesia.
Hunslet Locomotives Canada Ltd., P.O. Box 580, Haileybury, Ontario.

Agents in many parts of the world

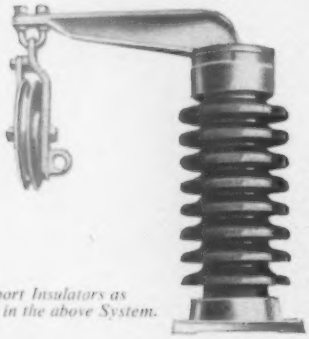
H96

D

Electrification and Bullers go together . . .

A typical 25 KV overhead System with Insulators supplied by Bullers.

Published by courtesy of the main contractors Messrs. British Insulated Callenders Construction Company Limited.



Support Insulators as used in the above System.

Always have . . . always will. It's all Lombard Street to a china orange that Bullers are "part of the plan" in electrification where and when insulators and their fittings are concerned.
We have supplied many schemes all over the world for the past 50 years including:
British Railways (conductor rail, overhead AC & DC)
London Passenger Transport Board (conductor rail)
Argentine Railways (conductor rail)
Brazilian Railways (overhead)
Bolivian & Chilean Railways (conductor rail)
Indian Railways (overhead)
New South Wales Railways (overhead)
Polish State Railways (overhead)
South African Railways (overhead)
Victorian State Railways (overhead)

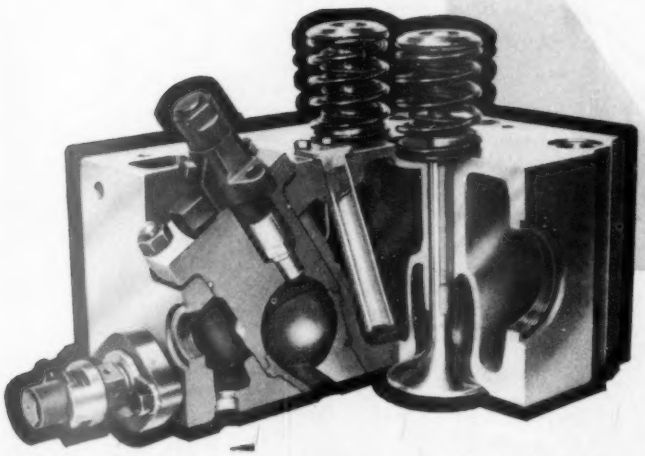
BULLERS LIMITED MILTON · STOKE-ON-TRENT · STAFFS

PHONE: STOKE-ON-TRENT 54321 (5 LINES). GRAMS & CABLES: BULLERS, STOKE-ON-TRENT

LONDON OFFICE: 6 LAURENCE POUNTNEY HILL, E.C.4. PHONE: MANSION HOUSE 9971. IRONWORKS: TIPTON, STAFFS. PHONE: TIPTON 1691

Werkspoor RUB engines

Ricardo whirl chamber ensures complete combustion



Werkspoor RUB engines have Ricardo whirl chambers in the cylinder heads, where the injected fuel and the combustion air are thoroughly mixed. Optimum combustion efficiency is attained, and fuel consumption is reduced to a minimum. The atomizer having a large orifice, permits a low injection pressure and the chance of the orifice becoming clogged is practically nil. Even at low loads the exhaust is smokeless and the fuel consumption is low. Throughout the speed range the torque is almost constant. *The engines are economical and have a wide range of applications.*

Werkspoor RUB engines are four-stroke, high-speed V-engines available with capacities ranging from 320 to 3,000 h.p. at 900 to 1,500 r.p.m. Bores 160 and 215 mm. Ricardo whirl chambers are manufactured under licence from Ricardo & Co. Ltd., London.

WERKSPOOR

AMSTERDAM WORKS (HOLLAND)

Standardize

ON COMPLETE

ROLLS-ROYCE

DIESEL-HYDRAULIC EQUIPMENT

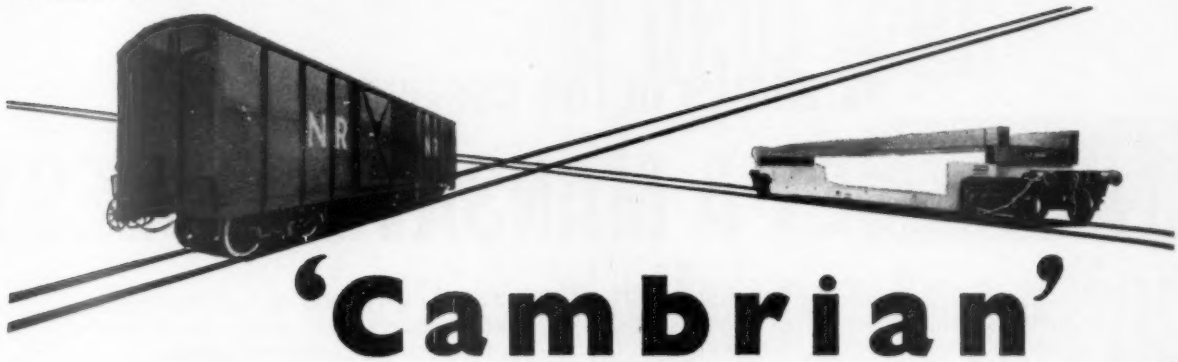
FOR SHUNTING, FREIGHT AND MIXED TRAFFIC LOCOMOTIVES

• Compact power • Competitive price • Proven running economy • Easy maintenance • Long periods between overhauls • Rationalized spare parts • World-wide after-sales and spares service • Technical advice from specialist Railway Traction Department • Diesel-electric and diesel-mechanical equipment may also be supplied

Builders of locomotives and railcars, and operators who are considering redesigning and re-engining existing equipment, are invited to write to:

ROLLS-ROYCE LIMITED · RAILWAY TRACTION DEPARTMENT · SHREWSBURY *(Tel: 52262)* ENGLAND

ROLLS-ROYCE—AERO ENGINES · MOTOR CARS · DIESEL AND PETROL ENGINES · ROCKET MOTORS · NUCLEAR PROPULSION



'Cambrian'

rolling stock

Steel, Aluminium and Timber Wagons of all descriptions and capacities for home and overseas railways.

Laminated spring manufacturers

A MEMBER OF THE POWELL DUFFRYN GROUP OF COMPANIES

PDE POWELL DUFFRYN ENGINEERING CO. LTD

CAMBRIAN WORKS, MAINDY, CARDIFF · Telephone: CARDIFF 29611 · Telegrams: PEEDENG, CARDIFF

London Office: 19 Berkeley St., W.1. Telephone: HYDe Park 7010

It shows in the costings—

THE MONEY A MANSAVER SAVES!

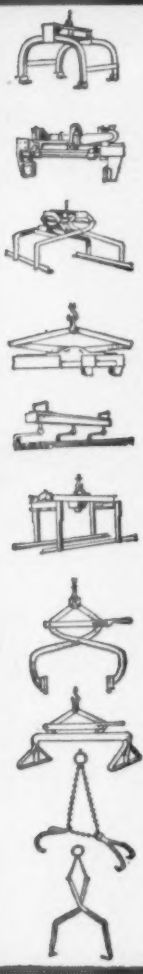
- Electrically operated "Mansaver" grabs give maximum speed and ease of operation, plus maximum safety.
- The "Mansaver" range of grabs is the result of long and detailed research into industrial needs and conditions.
- There's a "Mansaver" grab to handle coils, sheets, bars, slabs, billets, tubes, paper reels, palleted loads, bales, barrels and many other materials.
- Manual, semi and fully automatic mechanised grabs for other applications.

"Mansaver" Style 1142 4½-ton hand-operated grab handles sheet steel packages for Coventry Radiator. 48" to 112" length, 24" to 50" width. Leg adjustment for width by hand-chain wheel. End hooks fitted to support sheets at mid-span where required.

For Alcan Ltd. England—10½-ton motor-operated "Mansaver" Style 1142 handles aluminium slabs up to 85 feet long, 36" to 84" wide. 13 pairs telescopic legs are adjusted for load width by one common drive. Two-point suspension from overhead crane.

The "Mansaver" grab, Style 1588, motor operated rotating crane hook to give controlled rotation of loads where required. Illustration shows a "Mansaver", Style 1418, motor operated coil grab suspended from the hook.

50 tons capacity, "Mansaver" grab, Style 1142. Handling trays of aluminium coil at Alcan Ltd. Legs are power operated and controlled by overhead crane operator.



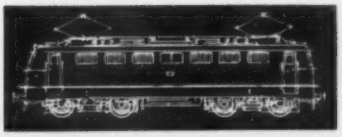
FOR TECHNICAL DETAILS OF THESE AND THE MANY OTHER 'MANSAVER' APPLICATIONS, WRITE OR 'PHONE

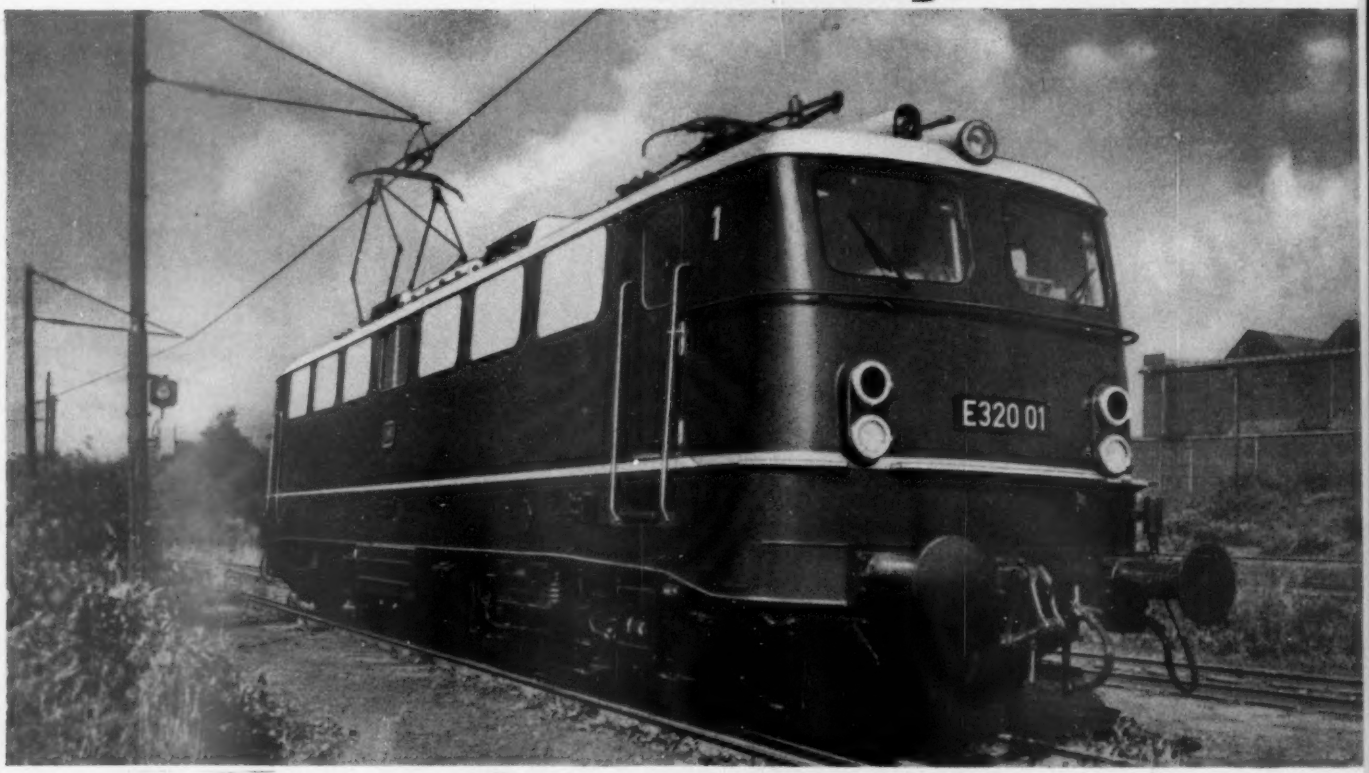
KING

GEO. W. KING LTD.

ARGYLE WORKS (RG/70), STEVENAGE, HERTS. TEL: STEVENAGE 440

A new type of railway traction





In the various railway systems there are variations in the kind of current for electric traction that partly result from the moment of commencement of electrification and partly from the intended use of the trains. Our double-system locomotive type E 32001 as the latest result of a collaboration between Krupp, AEG, and the Munich Federal Railway Central Office embodies the start of the development of a novel model of traction by which trains can be operated with one and the same locomotive within different traction systems either in their own country or in crossing borders to foreign countries. Thus you will reach your destination even faster by the aid of our locomotive E 32001.

Data of the double-system locomotive E 32001 for passenger and goods train service:

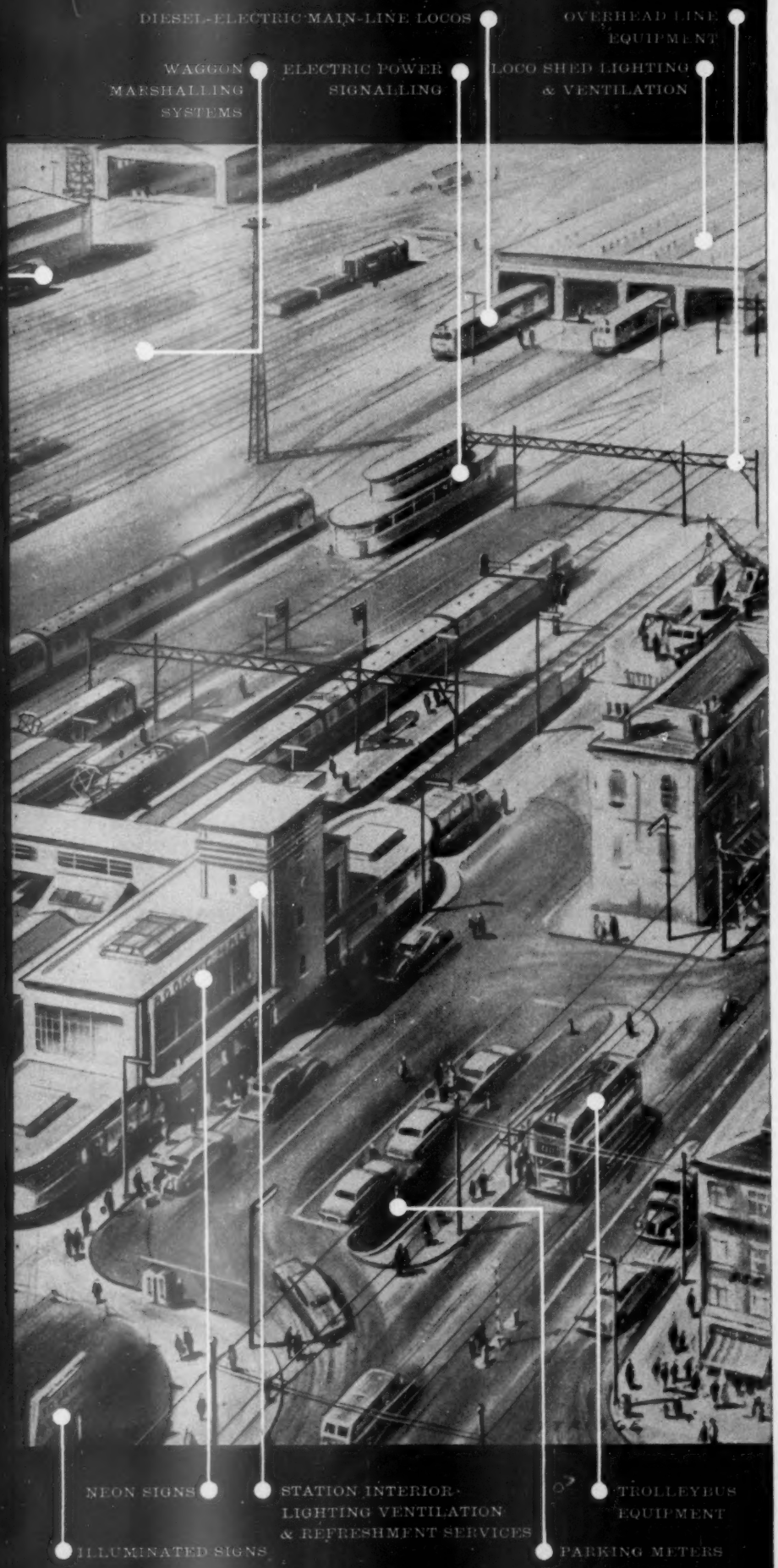
Motor output	2760 kW
Max. speed	120 km
Max. tractive effort on starting	30,6 t
Weight in working order	82 t
Type of current	16 $^{2}/_{3}$ c. p. s., 50 c. p. s.

150 YEARS
KRUPP
1811–1961

FRIED. KRUPP MASCHINENFABRIKEN ESSEN

All enquiries and communications to sole agents in U. K.: **J. M. J. Maus, Ltd., 35, New Broad Street, E.C.2. Tel. London Wall 6934 (4 lines). Inland Telegrams: Hicbat, London, Telex. Telex: London 28271**

SIDING FLOODLIGHTING
COMPLETE MARINE ELECTRIFICATION
DOCK ELECTRICAL INSTALLATIONS
DIESEL-ELECTRIC SHUNTERS
ALL-ELECTRIC WORKSHOPS
WAGGON TIPPLERS
FREIGHT AND PASSENGER DIESEL ELECTRIC LOCOS
MULTIPLE-UNIT TRAINS
STATION LIGHTING
ELECTRIC LOCOS
TELECOMMUNICATIONS
SUB-STATION EQUIPMENT
ROLLING STOCK CATERING EQUIPMENT
CARRIAGE LIGHTING & HEATING EQUIPMENT
LOUDSPEAKERS



the picture tells the story

G.E.C. designs, manufactures and installs equipment for the complete electrification of railway systems.

RELY ON THE EXPERIENCE OF

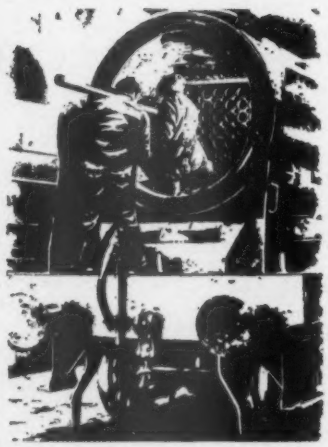
G.E.C.

THE GENERAL ELECTRIC CO LTD
OF ENGLAND
TRACTION DIVISION,
BIRMINGHAM 6

'ALFLOC' ON THE FOOTPLATE

Like most of us, the 'Alfloc' man probably once wanted to be an engine-driver. And, though his one-time ambition may have eluded him, he plays a vital part in helping the engine-driver. For 30 years, the 'Alfloc' Water Treatment Service of Imperial Chemical Industries Ltd. has been building up an unparalleled volume of skill and experience in handling problems of railway water treatment. Today, the 'Alfloc' man is helping to keep engines—both steam and diesel—out of the time-consuming sheds, helping to avoid exasperating breakdowns, helping to eliminate all problems connected with water usage.

Maybe the 'Alfloc' man can't drive the engine—but he brings the scientific and technological resources of I.C.I. to bear on all water problems that arise in keeping the engines running.



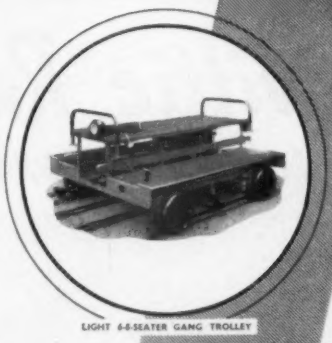
'alfloc' ICI

IMPERIAL CHEMICAL INDUSTRIES LIMITED
'ALFLOC' WATER TREATMENT SERVICE,
4 CROMWELL PLACE, LONDON, S.W.7.

AL.43

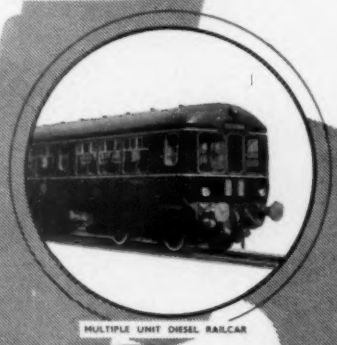
Any of these will pass the closest inspection –

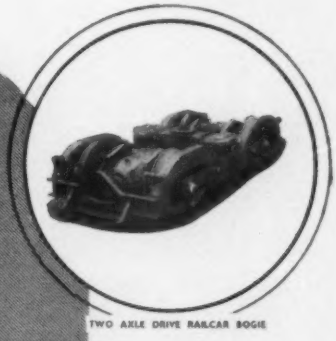
9-SEATER SALOON INSPECTION CAR


LIGHT 6-8-SEATER GANG TROLLEY

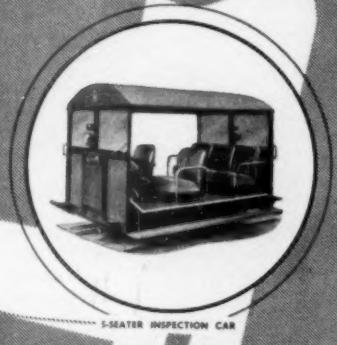
1-2-SEATER LIGHT INSPECTION TROLLEY

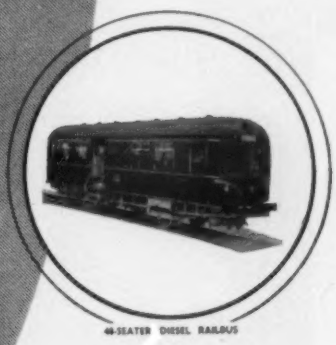
STEEL FRAME HANDCAR


MULTIPLE UNIT DIESEL RAILCAR


TWO AXLE DRIVE RAILCAR BOGIE

FIRST CLASS PASSENGER DIESEL RAILCAR


5-SEATER INSPECTION CAR


48-SEATER DIESEL RAILBUS

– let us examine **YOUR PROBLEM**

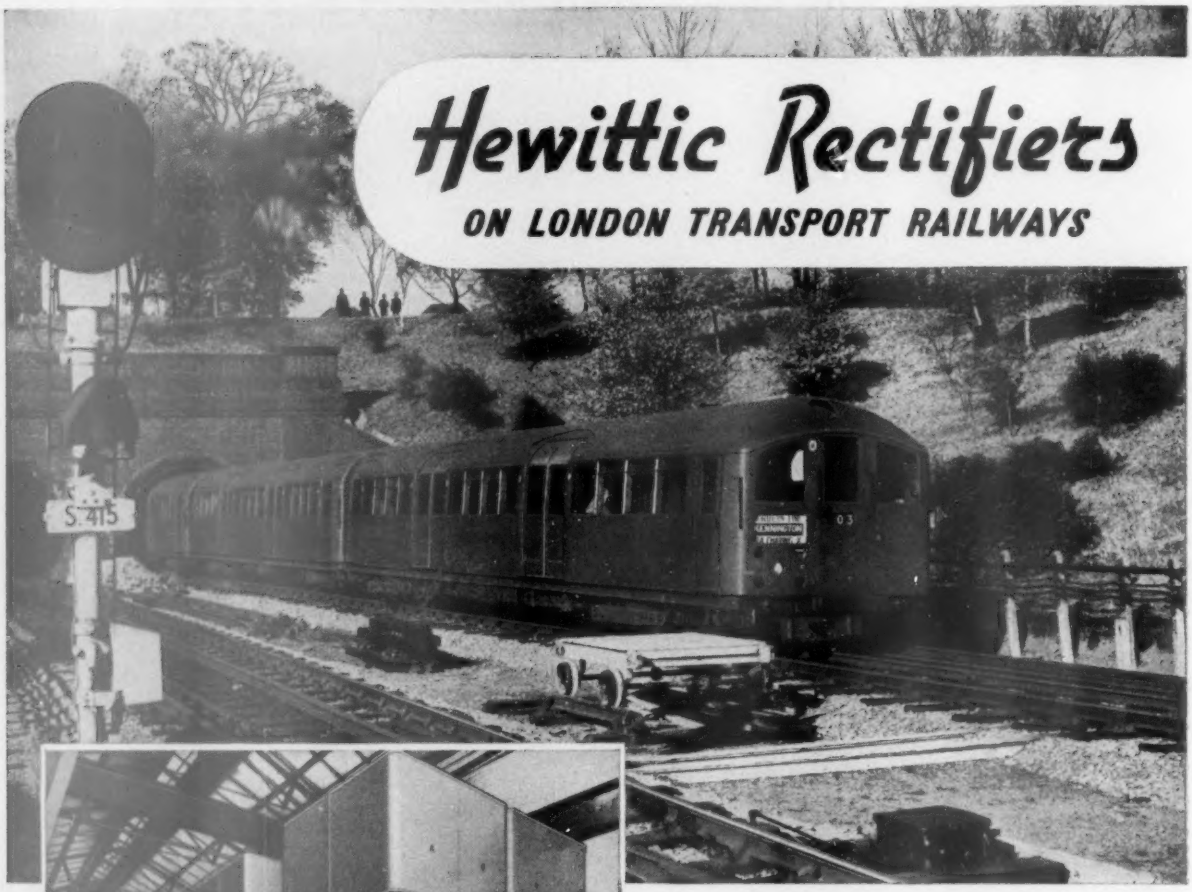
D. WICKHAM & COMPANY LIMITED

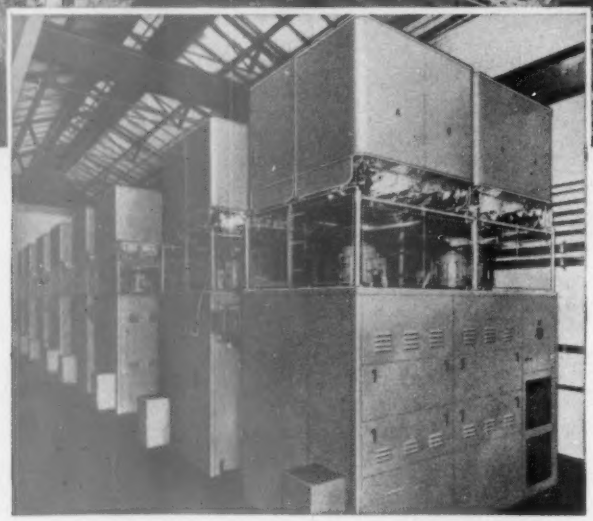
TELEPHONE WARE 2394-6 WARE HERTFORDSHIRE ENGLAND CABLES – WICKHAM, WARE

SPECIALISTS IN THE DESIGN AND CONSTRUCTION OF DIESEL RAILCARS, LIGHTWEIGHT RAILBUSES, INSPECTION AND TRACK MAINTENANCE CARS, OVERHEAD LINE INSPECTION TROLLEYS AND OTHER SPECIAL PURPOSE VEHICLES, HAND CARS AND TRACK TOOLS

Hewittic Rectifiers

ON LONDON TRANSPORT RAILWAYS





The illustrations show a train on the Northern Line at Hendon and the 4,000 kW substation at Bond Street (Central Line) equipped exclusively with Hewittic Rectifiers. The plant comprises four 1,000 kW combined rectifier and transformer units, the transformers being totally enclosed air-cooled. This Company is also responsible for the supply and installation of all A.C. and D.C. control gear at this substation. Some 90,000 kW of Hewittic Rectifiers have been supplied to the London Transport Executive.

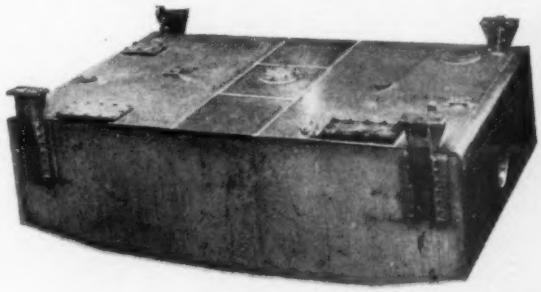
Over 1½ million kW In World Wide Service

*** HEWITTIC RECTIFIERS—PUMPLESS—AIR COOLED—UP TO ANY CAPACITY**

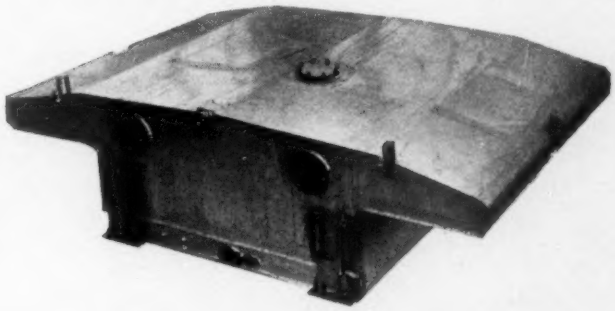
HACKBRIDGE AND HEWITTIC ELECTRIC CO., LIMITED
WALTON-ON-THAMES - SURREY - ENGLAND
Telephone: Walton-on-Thames 28833 (8 lines) Telegrams & Cables: "Electric, Walton-on-Thames"

Weight on your mind?

If you've a weight-saving or heat-transfer problem on your mind, bring it to Marstons.



Marstons offer a comprehensive design and production service for locomotive components — from complete cab assemblies in light alloy and laminated plastic to element-type radiators in light alloy or copper-brass.



Long experience in this field enables Marstons' designers and technicians to find the quickest and best route to the solution of your problems.

ICI

Marston Excelsior Ltd., Fordhouses, Wolverhampton

a subsidiary of Imperial Chemical Industries Ltd.

MAR 395

On the Liverpool St.,–King's Lynn run . . .

. . . with power by Mirrlees

A Mirrlees 1365 h.p. 'JV' engine powering a Brush type II locomotive is seen here leaving Ely.

Each week the engines made by Mirrlees—go to Loughborough . . . each week the locomotives made by Brush—go to Doncaster . . . each week, after the completion of Acceptance Trials further locomotives enter service on the EASTERN REGION.

MIRRLEES, BICKERTON AND DAY LIMITED
HAZEL GROVE · STOCKPORT · CHESHIRE
Telephone: STEpping Hill 1000 (15 lines) *Telegrams:* "Mirrlees, Telex, Manchester"

Mirrlees diesels

A member of Hawker Siddeley Industries

RTE 11

GET INTO THE JOB WITH A TAYLOR JUMBO

Excelling under low headroom conditions, completely self-contained, Taylor Jumbo cranes—each a powerful, low cost combination of diesel economy and hydraulic simplicity—are ideally suited to all railway goods handling operations. Speeding truck and wagon turnround . . . serving all parts of the goods yard . . . moving materials of every kind with safety and despatch.

Such is their versatility, Taylor Jumbo cranes are kept constantly on the move—perpetually fostering the economies which today's railways demand.

TAYLOR

Mobile Cranes

F. TAYLOR & SONS (MANCHESTER) LIMITED.

STEEL HOUSE, EASTCOTE, MIDDLESEX.

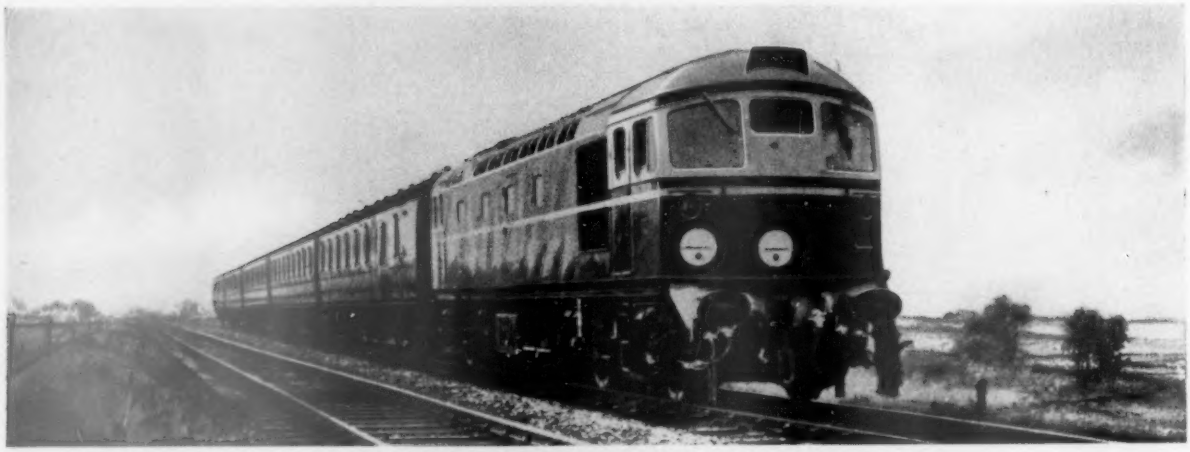
SALES AND SERVICE: LONDON, BRISTOL, BIRMINGHAM, MANCHESTER, LEEDS, NEWCASTLE, GLASGOW.

A MEMBER OF THE STEEL GROUP OF CRANE AND EXCAVATOR MANUFACTURERS

1014

When you think of.....

Bogie centre pivot liners and wear sleeves
Bolster rubbing plates
Swing link seats
Horn cheek liners
Axle box thrust pads
Side bearer pads
Drawgear bushes
Corridor end facings
Pantograph bushes
Brake gear bushes
Buffer stem guides
Door guides and rollers



Think of FEROBESTOS —first

Ferobestos asbestos reinforced plastics are designed for the job—and designed to last.

In very many railway applications Ferobestos materials are proving that they do a better job than conventional materials—every time.

How? By lasting longer under extreme conditions of temperature variation, vibration, and shock loading. And by requiring little or no lubrication or maintenance of any kind.

No wonder railway engineers all over the world are turning to J. W. Roberts—and Ferobestos—for workable new solutions to familiar locomotion problems.

Engineers and builders of rolling stock are invited to write for the new Ferobestos catalogue which covers all types of railway applications.

J. W. ROBERTS LTD.

A Member of the Turner & Newall Group
Chorley New Road, Horwich, Bolton.
Telephone: Horwich 840.

JWR. 54

METCALFE'S

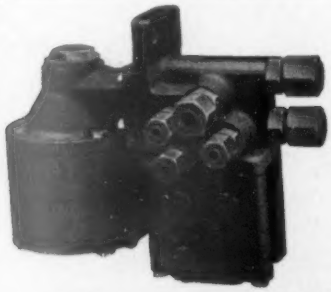
AIR BRAKE EQUIPMENT for Locomotives

OERLIKON PATENT DESIGN

TYPE FV.3 An Automatic Driver's Air Brake Control Valve suitable for medium length goods and passenger trains or railcars, etc. This Valve is simple to operate and of light weight construction. It enables the full benefit to be obtained from modern step-by-step application and release of air brakes. Leaflet A.1.

TYPE FV.4 A standard Driver's Automatic Air Brake Control Valve with automatically controlled high pressure brake releasing impulse. This Valve enables the maximum speed of brake release to be obtained, and in addition enables the full utilisation of all the advantages associated with modern air brakes. The Valve is reliable in service and simple to operate and maintain and is especially suitable for long express passenger and goods trains. Leaflet A.4.

TYPE FD.1 This is a simple Brake Control Valve suitable for direct braking or shunting brake requirements. It is very simple to use and accurate in operation. The type FD.1 Valve can also be adapted for the control of the Diesel engines and can also be made suitable for cam operation. Leaflet A.13.



TYPE LST.1 A locomotive Triple Valve of modern and simple design. The LST.1 Operating Valve embodies a control for freight or passenger train operation, together with a high efficiency Brake relay, also an Anti-skid Brake device may be provided when required. This Valve is capable of controlling the air supply to several Brake Cylinders when required. Leaflet A.2.

DAVIES & METCALFE LTD.

INJECTOR WORKS · ROMILEY · ENGLAND

Telephone: WOODLEY 2626 (2 lines) Telegrams: EXHAUST, ROMILEY

R.G.6

E

1961-1962 edition now on sale

The Sixty-seventh Edition reflects the ever-changing pattern of the railways of the world. Political evolution of the African continent and mergers among U.S.A. railways have caused long-familiar headings to disappear and new to emerge.

Noteworthy extensions of electrification are recorded, and the growth of diesel traction has affected rolling stock statistics materially.

New features include an article on Railcars and an illustrated description of the revised British Train Head Codes.

Contains a wealth of railway information and statistics in a compact and accessible form. It gives the latest details of the organisation, mileage and gauge, locomotives and rolling stock, financial results and personnel of the world's railways. Revised maps of British Road Services Divisions and British Waterways Organisations. Separate sections on Locomotive & Rolling Stock and Signalling suppliers.

PRICE **60/-** NET

POSTAGE 2/-

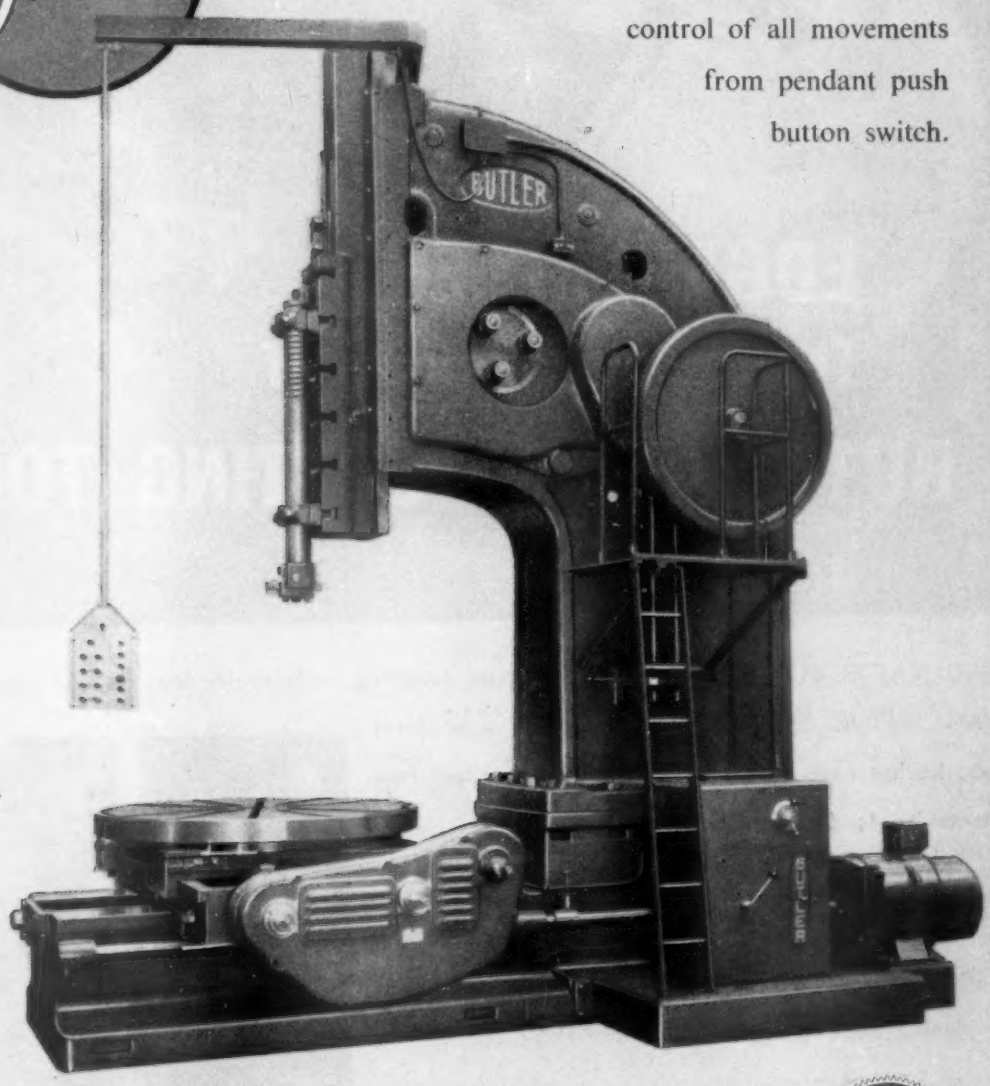
Published by **TOTHILL PRESS LIMITED**

33 TOTHILL STREET · WESTMINSTER · LONDON · S.W.1

Butler

30in. High Production Slotter

with electric feed and traverse unit, magnetic clutches, and complete control of all movements from pendant push button switch.

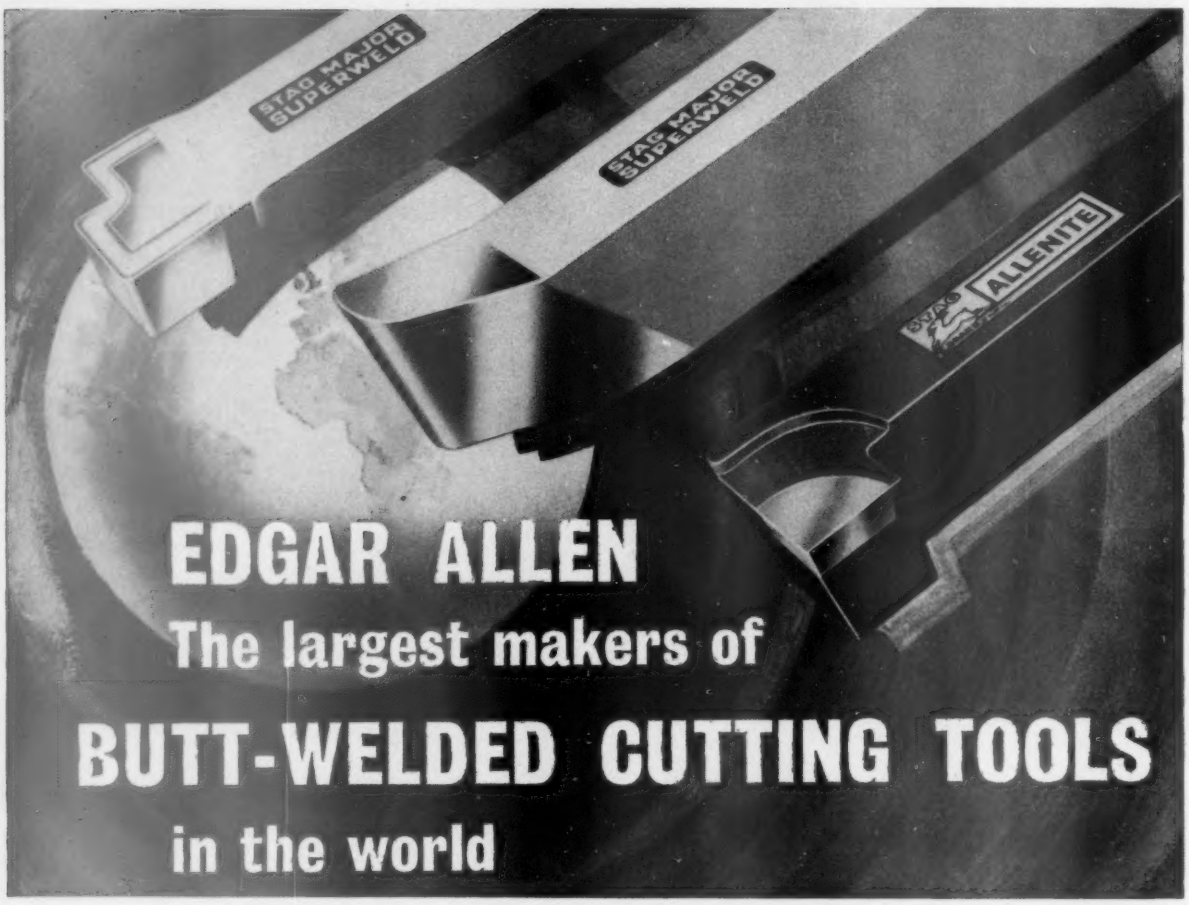


BRITISH MACHINE TOOL MAKERS ASSOCS LTD

The BUTLER MACHINE TOOL Co. LTD.
HALIFAX TELEPHONE 61641 ENGLAND

PLANERS
SHAPERS
SLOTTERS

8321-1A



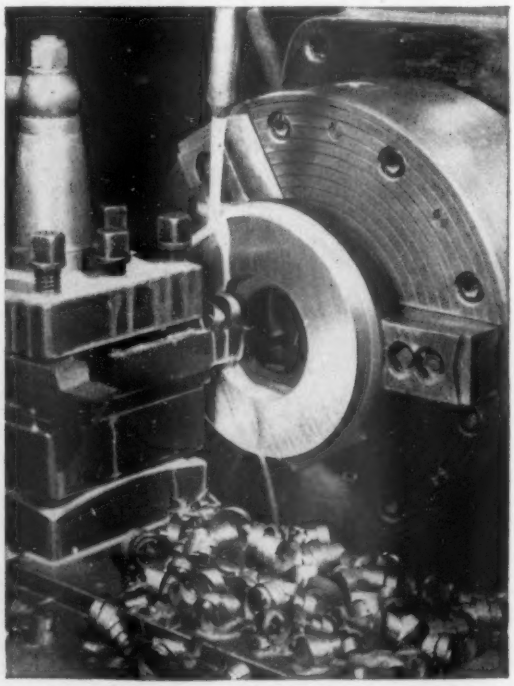
STAG MAJOR SUPERWELD general purpose roughing tools in 16 sizes and 53 shapes, ex stock.

STAG MAJOR SUPERWELD precision-ground form tools, having ends of Stag Major high-speed steel fuse butt-welded to high grade steel shanks.

ALSO

ALLENITE TUNGSTEN CARBIDE tools and tips.

PLOWRAKE and PLOWCAST tungsten carbide tools for planing steel and cast iron respectively.



EDGAR ALLEN & CO. LIMITED

IMPERIAL STEEL WORKS · SHEFFIELD 9

ETD 70/RG

EDGAR ALLEN & CO. LIMITED · SHEFFIELD 9

Please send data on Butt-Welded Cutting Tools to :—

NAME.....

POSITION.....

FIRM.....

ADDRESS.....

The

RAILWAY GAZETTE

INCORPORATING: THE RAILWAY ENGINEER • TRANSPORT • THE RAILWAY NEWS • THE RAILWAY TIMES • RAILWAYS ILLUSTRATED
HERAPATH'S RAILWAY JOURNAL (ESTABLISHED 1835) • THE RAILWAY RECORD • THE RAILWAY OFFICIAL GAZETTE

An international journal of management, engineering and operation

VOL 115 FRIDAY NOVEMBER 17 1961 No. 20

CONTENTS

	PAGE
Editorial notes	553
Finance and the B.T.C.	555
Further improvement in safety	556
E.A.R. & H. expenditure	556
Letters to the Editor	558
The scrap heap	559
Overseas railway affairs	560
Publications received	561
Accidents on British Railways in 1960	562
Modernisation of Shrewsbury Station in the Western Region	564
Dundee Diesel Depot	566
Electric railway traction section—	
A French electric traction group	567
Improving the power of old locomotives	567
Pantograph test coach for Eastern region	568
Control systems for 50-cycle motor coaches	570
Modernisation of power distribution to London Transport railways	572
Personal	575
New equipment and processes	577
Accident report—derailment between Rugby and Lutterworth	579
News articles	580
Contracts and tenders	582
Notes and news	583
Railway stock market and official notices	584

Editor: B. W. C. Cooke, Assoc. Inst. T.

33, TOTHILL STREET, WESTMINSTER, LONDON, S.W.1

Telephone: WHitehall 9233 (24 lines)
Telegrams: "Trazette Parl London"
Overseas telegrams: Trazette, London, S.W.1

MEMBER OF THE AUDIT BUREAU OF CIRCULATIONS

BRANCH OFFICES

GLASGOW: 139, Bothwell Street, C.2 ... ... *Central 4646*
NEWCASTLE UPON TYNE: Cathedral Buildings, Dean Street, 1 *Newcastle upon Tyne 22239*
MANCHESTER: Century Insurance Building, St. Peter's Square *Central 7667-8-9*
BIRMINGHAM: 90, Hagley Road, Edgbaston ... *Edgbaston 5454 (Three lines)*
LEEDS: 70, Albion Street ... ... *Leeds 27174*
BRISTOL: 20, Victoria Square, Clifton ... ... *Bristol 33873*

Annually £5 by post Single copies, two shillings
Registered at the G.P.O. as a newspaper. Entered as second-class matter in U.S.A.

"Porpoising along the baseline"

DR. RICHARD BEECHING, Chairman of the British Transport Commission, probably spoke from his recent experience when he opened the International Factory Equipment Exhibition at Earls Court on Monday. He talked of the danger for British industry of "porpoising along the baseline, drifting in and out of trouble," and pointed out that fluctuation in the economy was almost inevitable. He felt that the Government should provide the economic climate which urges, encourages, if necessary forces, improvements. Although he felt that the "pause" which was now being experienced was necessary as a pause in folly, he was more interested in the gap which went on throughout the year. Dr. Beeching may well have had in mind the British Transport Commission when he said that he had particular reason to know how dangerous it was to let productivity lag behind what it could be in the case of large organisations. The drift could go on for a long time before the consequences became apparent, and when they did the gap was wide and the task of closing it very considerable. Dr. Beeching's remarks obviously have their place in the general economic situation of the country, more particularly as it concerns the export trade. Here there is a very real reason for the Government to provide the economic climate in which exports can be encouraged and manufacturers of initiative and efficiency can be induced to make especial efforts to enter world markets. As has been frequently stressed in these columns, the market for railway materials is still large in overseas territories, where the railway systems are endeavouring to modernise their undertakings. If the British manufacturer is not assisted to meet competition from his competitors, the Government cannot escape responsibility for failure to promote a very worthwhile trade. The vacillating policies of governments in recent times have had the most adverse effects, particularly on large-scale organisations such as the British Transport Commission, which has had constantly to cope with hesitancies and reversals in policy. The effect on the railway supply industry has been grave, for it has never been able to determine any long-term policy based on a reasonable assessment of home demand and overseas trade.

European export convention

FROM November 29 to December 2, a national Convention attended by some 500 United Kingdom businessmen will be held at Eastbourne under the auspices of the Export Council for Europe. The opening meeting on November 29 will be addressed by Mr. Selwyn Lloyd, Chancellor of the Exchequer; Sir William MacFadzean, Chairman of the Export Council, and Sir Norman Kipping, Director-General of the Federation of British Industries. Many aspects of manufacture and industry will be discussed: among other subjects, industry groups will cover heavy transport and mining machinery (Chairman, Sir Leslie Rowan, Director, Vickers Limited); electrical and electronic engineering (Chairman, Sir Joseph Lockwood, Chairman of E.M.I. Limited), and producers' goods, metals, and components, both ferrous and non-ferrous (Chairman, Mr. H. W. A. Waring, Deputy Chairman & General Managing Director, Guest Keen & Nettlefolds Limited). Marketing and study groups will cover the training of salesmen; market research; exhibitions, trade fairs, and trade weeks, and will include a ten-man panel of transport representatives, including Mr. John Ratter, Member of the British Transport Commission.

Refrigeration and British Railways

ALTHOUGH refrigerated vehicles are an established aspect of road haulage, they are not available on British Railways, which confines its cold-transit facilities at present to various types of insulated containers. Of these, the unit offering the greatest degree of refrigeration is the Type AF, which makes use of dry ice and, if the user has suitable plant, of eutectic plates. The problem of providing refrigerator facilities in a railway wagon

or container is not one of expense alone, but also of space. The British Transport Commission also feels that in view of the relatively short distances and transit times involved in freight carriage in this country, it has gone far toward meeting users' requirements in the frozen goods field. This may have been a valid reason in the past for not matching the facilities offered by another form of transport, but it is not one acceptable today, when British Railways wants all the traffic it can get. It is good to learn that the Commission's research department is working on the problem of the refrigerated wagon, and it is to be hoped that a satisfactory answer will soon be produced.

Selling a difficult situation

MUCH is heard today of "consultation," which has come to be associated in most people's minds with management/men relations. It is a word not so often applied to those parleys and negotiations which often (but not always) precede a railway announcement that it intends to raise an accepted rate. Yet consultations must become increasingly frequent between railway commercial officers and users in Britain, if the new freedom to fix charges promised in the Transport Bill is to produce its maximum benefit. As we stated editorially last week this freedom has been late in coming, and it may be that initial increases will be heavy or, if inconsiderable, swiftly followed by other rises until the effect of a heavy increase has been achieved though over a longer period. Whichever method of augmenting receipts is followed, existing customers—and particularly customers of long standing—should always be taken into the railways' confidence in good time to allow for due adjustment to be made to the customers' own charging. As businessmen, most users will be prepared to give sympathetic hearing to a good case presented well in advance of the necessity; traffic is much more likely to be lost if a heavy increase is unexpectedly sprung on a concern probably already experiencing its own financial difficulties.

Bus companies and the Transport Bill

SPEAKING at the annual dinner of the Public Transport Association on November 9, the Chairman, Mr. R. J. Ellery, said that there were several provisions of the Transport Bill recently placed before Parliament which appeared to be of concern to members of the Association. Among these were the transfer to a Holding Company of the British Transport Commission's shareholdings in the provincial bus companies; the extension of the powers of London Transport, and the freeing of the railways (outside London) from control over their charges. Mr. Ellery went on to say that there were other clauses in this complicated Bill which the industry would need to study but he felt that it would be the greatest possible pity if the partnership which had existed for over 30 years between the railways and a major section of the bus industry, and which has worked so well in the interests of the travelling public, were to be lost or weakened. The industry was not entirely happy about some of the London proposals either and he suggested that the Minister of Transport might consider that what was sauce for the goose was sauce for the gander.

Railway Clearing House maps

THE Railway Clearing House, although it no longer exists as a separate entity, continues to function within the organisation of the British Transport Commission and is still responsible for the publication of maps. In the book by Professor J. Simmons entitled "The Railways of Britain," which was reviewed in our issue of March 10, the statement was made that Railway Clearing House maps are no longer made. This is not so. It is true that there has been no new issue of these excellent maps for some years but revised maps are in the course of production. It is hoped that there will be available shortly a revised map of Scotland, brought up to date to the end of 1960, and this will be followed by a revised map of England & Wales. Eventually the map of London & Environs will be reviewed and re-issued. Many railwaymen will be grateful for the opportunity to obtain copies of these very useful re-issues for there has been a great deal of change in the railways of this country since these maps were last issued.

Indian Industries Fair

THE Board of Trade has provided an official British exhibit at the Indian Industries Fair, which opened in New Delhi on November 14, and has also provided a large commercial display of British products. Within the British pavilion, which occupies about two-thirds of the available space, one section is devoted to the theme "Britain—India's industrial partner," and contains an illustration of Britain's contribution to the industrialisation of India in the fields of finance, transport, communications, power, industrial production, health and knowledge. The second section of the pavilion contains the commercial display in which British companies, and Indian companies with British connections are staging individual exhibits. Ten other companies with British connections are exhibiting independently on sites adjacent to the British pavilion. The transport exhibit in the pavilion takes the form of models and photographs of locomotives and equipment. Other railway equipment is on display by independent exhibitors, such as the Rolls-Royce diesel-hydraulic shunting locomotive illustrated in our news pages this week.

Across Europe to the Orient

ONE by one the great trans-European *trains-de-luxe* of the past are succumbing to the combined effects of air competition and the Iron Curtain. Many years ago they ceased to be trains comprising only first class sleeping and restaurant accommodation; the inclusion of second class sleeping accommodation was followed later by the addition of ordinary coaches and an eclipse in speed by much faster trains, particularly the modern "T.E.E." services. Now the journeys of the former transcontinental trains themselves are being cut down and their names changed in consequence. Last summer, the "Arlberg-Orient Express" was cut short at Vienna, on its eastbound run, and a sleeping car for Budapest and Bucharest is no longer included. Further decisions of the same kind have been reached by the recent European Timetable & Through Carriage Conference, reported elsewhere in this issue. The "Simplon-Orient Express" is to work no further east than Trieste and to become simply the "Simplon Express," just as the "Arlberg-Orient Express" will in future be known as the "Arlberg Express." The name "Direct-Orient" will be assumed by an existing train of indifferent speed and many stops. The "Orient Express" will remain, but with connections only, and no through sleeping cars or coaches, to places east of Vienna.

London to Paris

ON page 581 we give details of the acceleration of the cross-Channel services *via* Dover and Folkestone which will operate next summer as the result of the latest Southern Region electrification, which will cut the times between Victoria and the Channel ports by an average of 20 min. The most substantial improvement will be that of the afternoon service from Paris, which will leave Paris Nord at 1.39 instead of 2.21 p.m., and arrive in Victoria at 8.50 instead of 10.10 p.m., an acceleration of 36 min. The fastest London-Paris time will be that of the outward "Golden Arrow" Pullman service, taking 6 hr. 50 min. By other services, the overall times will vary between 7 hr. 11 min. and 7 hr. 41 min. It is pertinent to recall that as far back as 1905 the London-Paris journey could be made in 6¾ hr., while in later years a departure from Charing Cross

at 4.30 p.m. permitted a Paris arrival by 11 p.m., in 6½ hr. In 1939, there were four outward services daily in 6 hr. 41 to 48 min., to equal which much leeway still remains to be made up. In view of the great advances in speed made in recent years by the French National Railways, and the present advantage of very fast electric running between Amiens and Paris, it is surprising that the French times between Calais, Boulogne and Paris are still appreciably slower than the best of all-steam days.

Seaports and the transport chain

PRESENTING his paper "Seaports as links in the transport chain," at the Institute of Transport on November 13, Viscount Simon, Chairman, Port of London Authority, said that over the last 30 years more traffic has been arriving at ports by road and less by rail, and the same trend has persisted with traffic distributed from the ports. This had necessitated much re-arrangement of facilities within the ports and it called for the redevelopment of lines of access outside. In the case of ports developed by the railway companies, access to and from the hinterland by rail had been planned as a part of the project and integrated with the port development. In most cases both road and rail access had been provided by the appropriate administrations without any direct co-ordination with the port authority. Although recognising that internal communications may have other tasks to perform besides dealing with port traffic, it seemed to him that there was room for better co-ordination between the various authorities concerned, and this might bring substantial rewards.

Locomotive power from fuel battery

THE Manager of Railway locomotive sales for General Electric, Locomotive & Car Equipment Department, Mr. Robert M. Coultas, considered the fuel battery, or fuel cell with other power sources, in a talk at a two-day study group for railway personnel, sponsored jointly by the Association of American Railroads and the Armour Research Foundation. He acknowledged that the diesel-electric locomotive is today the standard motive-power unit in the United States. In suggesting that the fuel battery is potentially applicable to locomotives, Mr. Coultas stated that, as a direct source of d.c., the fuel battery offered the possibility of series connection to produce high voltages and could result in a reliable and efficient means of railway operation with a minimum of energy conversion. Other potential motive power systems discussed by Mr. Coultas were the gas-producer, gas-turbine cycle, as used on the Swedish State Railways, the diesel-hydraulic, and nuclear power. He told railway executives that railway mergers, competitive pressures, and technical improvements combined to make it necessary to consider higher horsepower, greater reliability, and a greater degree of automation. The use of hydrocarbon fuels directly as in the fuel battery allowed the full potential to generate electrical energy at low cost.

Finance and the B.T.C.

THE financial proposals of the Transport Bill, which provides for the dissolution of the British Transport Commission and the transfer of its undertakings to four Boards and a Holding Company, follow the lines of the White Paper in substance but vary in some detail. They lay considerable discretion with the Minister and the Treasury as to how the railways' future indebtedness and deficits are to be handled, and appear to be unnecessarily complicated.

Initially the Commission's indebtedness is transferred to a "commencing capital debts" account made up of the outstanding Transport Stock, advances made to cover past deficits and interest thereon, deferred interest on capital raised for modernisation, and the Capital Redemption accounts. From this are to be deducted the accumulated deficits up to the end of March, 1960, discounts on the issue of Transport Stock, and the investments standing to the credit of the Redemption Accounts. After this sum has been agreed there has to be added the surpluses earned since 1956, on the Commission's other undertakings than the railways and the grants made to meet the deficits since the beginning of April, 1960. Reduced to the simplest terms this complex calculation means that the commencing debt will by and large be the capital outstanding after the deficits up to last year have been written off. Clearly the Commission, and its successor Railway Board, will be in no position to meet interest on this, so it is provided that part of the commencing debt shall be suspended and no interest paid on it for the present—if ever. This is more simply calculated because in effect the total indebtedness of the Commission, except that part represented by the written-down book value of the assets created by the Commission since the end of 1955, is to be put into this suspended account. It is provided that after the "commencing capital debts" account has been calculated all but that part which represents these written-down assets shall be transferred to the "suspended debt" account. In fact, this means that the only indebtedness for which the Railways Board will be responsible at the outset is the capital value of the assets created since the modernisation programme was undertaken. That makes sense but it would probably have been better to make a once-for-all clean cut instead of leaving past indebtedness suspended over the Board like the sword of Damocles to be swung when the Minister so decides.

So much for the capital position. As to revenue, while all but the Railways Board and the Inland Waterways Authority are required to pay their ways from the outset, and the surpluses of the Boards are to be disposed of as the Minister thinks fit, the Railways Board is not expected to break even during its first five years. Provision is accordingly made for the Minister to make grants to meet the deficits during this period up to £450 million, that is, equivalent to £90 million a year, but the amount payable in any one year is not limited, provided the five-year total does not exceed the £450 million. Here again, the Board is not to be in the position of knowing where it stands. Somewhat unnecessarily, it seems, it is left to the Minister to decide how much of the deficit shall be met by grant and how much by loan. It is largely refusal in recent years to face the fact that, in the present state of railways the world over, accumulated deficits cannot be met out of future revenue that has aggravated the financial position of the Commission. In these columns the policy of deferring deficit payments instead of writing them off has frequently been criticised. It is regrettable that discretion is now left to the Minister, because it could lead to deficits over the next few years being met by loan and becoming a millstone round the new Board's neck which would handicap it from the beginning. It is to be hoped that the Bill will be amended during its passage to ensure that, during this difficult transitionary period, deficits are written off for good so that the Board's indebtedness is limited to tangible assets, namely the value of its modern assets. As it is, there is no certainty that the railways will be able to keep their deficits within the £450 million figure provided for during the five-year period. As there is no provision to meet any excesses by grants or loans, should they be greater than this amount the Board would have to borrow to meet them, pay interest thereon and be burdened by them in future years. The Minister should certainly explain during the Second Reading of the Bill, which is to be taken shortly, how this figure was arrived at.

In one respect, the Bill is an improvement over the White Paper, and even more over the Government's original intentions as first announced in Parliament two years ago. While it is provided that six Regional Railway Boards shall be established there is no reference to their finances in the Bill. This may mean that it has been decided to drop the proposal that they should be financially self-supporting. This proposal was criticised by this journal at the time it was made and subse-

quently, and also by the Select Committee on Nationalised Industries. Further, it is provided that the Chairman and Members of the Boards are to be appointed by the Railways Board and not by the Minister, although his approval must be given. This is as it should be because one of the difficulties arising from the Transport Act of 1947, which confronted the Commission and the Railways Executive was that the latter was appointed by the Minister and confusion as to the division of responsibility arose. Similarly, it is also provided that the Railways Board itself, and not the Minister—although again his approval is necessary—is to decide on the scheme of delegation of the powers and responsibilities of the Regional Boards. This is gratifying because it is essential not only that a certain degree of centralised administration and responsibility (especially for policy and standards) be preserved, but also that the seat of responsibility shall be known.

Further improvement in safety

THE report on railway accidents in 1960 by Brigadier C. A. Langley, Chief Inspecting Officer of Railways, gives the impression of a further improvement. It shows that the number of casualties sustained by passengers, railway servants, and other persons had fallen since 1959, and was also below the five-year average for 1956-60. In a sense one can say much more than this. These accident reports are concerned mainly with what went wrong, and not with the vastly greater number of occasions when things went right. As Brigadier Langley states, the number of passengers killed in train accidents in 1960 represents one death in 261 million passenger-journeys. Over the past 15 years, which included the Harrow and Lewisham disasters, there was but one chance in 50 million journeys of a passenger death in a train accident.

That is the true perspective for these annual reports. Brigadier Langley rightly states that all railwaymen can be proud of these achievements. Equally rightly he adds that more can be done to increase safety on the railways still further. The automatic warning system and safety devices in signalling have done much to prevent two major causes of disaster, namely drivers running through signals at danger and signalmen's errors. Here it is disconcerting to learn from the report that difficulty in obtaining equipment is retarding the extension of the automatic warning system to yet more lines. Risk to human life is too great a price to pay for delays of this kind—or indeed for economies imposed on the railways from above.

Yet many human failures are beyond the reach of protective devices. Safety must depend ultimately on the integrity, initiation, and discipline of the railway staff. Here the tale of irregularities to be found in this, as in previous annual reports, comes as a salutary reminder. Nor should it be forgotten that, although drivers' and signalmen's errors did not in 1960 cause accidents giving rise to serious casualties, in eight cases they might well have done so. It cannot be emphasised too often that the lessons to be learned from an accident have little connection with the number of casualties that result therefrom.

One point which unfortunately is becoming of growing importance is that it is not only railwaymen who can cause accidents. The section of the report dealing with accidents at level crossings should be read by the public as well as by the railway world. In particular, there are many occupation crossings, which not so many years ago carried a few farm carts or light vehicles but which now carry a constant stream of motor vehicles, some of a heavy or awkward type. It may be no coincidence that last year accidents at occupation crossings were the highest since the war. Motorists know full well how essential it is to obey traffic lights and other road warning signs. The same applies to level crossings, particularly those without crossing-keepers. Any driver who either fails to "stop, look, and listen," or leaves the gates open behind him is just as guilty as if he had committed any other offence within the categories of dangerous or careless driving. Indeed the results could be more serious, for by his carelessness he could wreck an entire passenger train.

Another point emerging from Brigadier Langley's report is that of the abolition or improvement of level crossings, including the provision of warning devices. This is a thorny question. At occupation crossings the railways are under no statutory obligation to incur this additional expense, while local authorities and road owners are naturally unwilling to do so. Yet it would be unjust for the whole burden to fall on the railways. The solution lies in fresh legislation, by which the cost could be shared equitably by all concerned, including road users themselves. This is a matter to which the Government should give attention.

The public has a responsibility in another direction. Casualties to children trespassing on the railways persist, and each represents a tragedy which should be avoidable. It is good to learn from the report that a vigorous safety campaign was launched during 1960 in co-operation with the school authorities. This campaign should be continued and intensified, and parents must play their part.

The 1960 report shows that modernisation has its problems as well as its gains. On the credit side, there is the downward trend over recent years of serious accidents arising from drivers' and signalmen's errors. On the other hand, the major problem last year was the series of failures in multiple-unit dual-voltage electric stock in the Scottish and Eastern Regions. Brigadier Langley has already issued two interim reports and his final report is due in a few months' time. His inquiry has been lengthy and exhaustive, but he has every expectation that multiple-unit electric trains on the British a.c. high-voltage systems will give thoroughly efficient and satisfactory service and will be as reliable and as safe as any in the world.

E.A.R. & H. expenditure in 1961-62

THE East African Railways & Harbours authority expects to earn £19,950,000 this year from railway operations—some £277,000, or 1·4 per cent, more than in 1960. For 1962, revenue is conservatively estimated at £20,100,000, or 1 per cent above this year. On the basis of ton-miles, the 1961 gain on 1960 should be 2 per cent, following an increase of 2·9 per cent last year over 1959. For the first time for some years, harbour revenue is expected to fall, and earnings are put at £5,090,000 in 1961 against £5,127,000 in 1960, and for 1962 are conservatively estimated at £5,230,000.

These figures were given to the Central Legislative Assembly at Nairobi on November 8 by Mr. G. P. G. Mackay, the Acting Commissioner for Transport, who took over following retirement of Sir James Farquharson last May. At the same time, draft official estimates of revenue and expenditure for 1962 and 1961 (revised) were published.

Throughout his speech Mr. Mackay emphasised the need for E.A.R. & H. to be kept on the hitherto sound financial basis throughout the 1960's which had earned it commendation from the International Bank for Reconstruction & Development. He posed the problems which have to be faced with mounting costs of replacement, the need for higher wages for lower-paid staff, the difficulty of raising new loan capital, and the expense of compensation to designated officers who will have the right to retire when the East African Common Services Organisation takes over the duties of the East African High Commission.

An important factor affecting working expenditure in 1961 has been implementation of the Flemming Salaries Commission Report, with resultant increases in staff emoluments to the amount of £855,000. The higher spending is estimated to be offset by £626,000 in 1961 and by £759,000 in 1962 by contributions from the Government under the Overseas Service Aid Scheme, which became fully effective from April 1, 1961. Under this, the Government meets the "Overseas Addition" element in the salaries of designated officers, the cost of education allowances, and one-half the cost of their passages. The arrangement will become effective on an "operative date"

yet to be announced, and compensation will be payable in instalments over five years. The first two instalments, expected in 1962, have been estimated to cost £3,750,000, of which the Government will meet half. The net compensation requirement of £1,875,000 has been transferred to a Special Deficiency Account pending consideration of how it can be financed. Excluding the compensation payments it has just been possible to balance the 1962 estimates, which show surpluses for the railways and harbours, respectively, of £19,078 and £17,122.

Breaking rail revenue down, Mr. Mackay told the Assembly that E.A.R. & H. expected to earn more in 1961 from goods, livestock and road services, and rather less from marine and catering services, with passenger and coaching traffic about the same as in 1960. The increased goods yield of £245,000 was possibly the most significant as it reflected a modest growth in exports, despite drought and poor crop conditions in Tanganyika and Kenya, a sustained level of imports and an increasing measure of internal movement.

" This is encouraging," he stated, " but I feel it is too early in this period of political change and economic uncertainty to be sure that the increase will be sustained, or if sustained, that it will be any greater next year than it has been this.

" In the last 30-odd years, taking the good with the bad, and using public net ton-miles as the relevant statistic, there has been a steady growth in traffic over the railways of East Africa of some 6 per cent cumulative per annum. The 1961 increase is of the order of 2 per cent.

" We are, it appears, if not in the doldrums, moving ahead but slowly and it would seem unwise in the absence of indications more positive than we have to assume any great change in 1962."

Ordinary working railway expenditure this year will be only £45,513 greater at £14,549,605 than in 1960. The Work Study group had revealed opportunities for savings amounting to £40,000-£50,000 over the next 12 months. Maintaining track by flying or mechanised gangs showed savings of from £20 to £60 per mile of track per year. Giesl ejectors in the locomotives offered savings of up to £100,000 annually. But there was no room for complacency. Standards of performance still fell short of what was desirable and possible. It was hoped in 1962 by present and planned economies, and despite certain higher costs, to maintain working expenditure in 1962 at only £86,000 or 0·6 per cent more at £14,674,782.

The estimates as framed did not make any specific allowance for increased cost of localisation, which would be £200,000 more in 1962. If savings did not meet the cost of localisation, supplementary estimates would be submitted. Too rapid a departure of expatriates or a too slow rate of replacement by local staff could throw the localisation policy seriously adrift. It was too early to predict how many expatriate staff would exercise an early option to go on the change of employer. But it was quite possible there would be gaps between their departure and effective replacement by local staff. The gaps would have to be covered by various expedients, and some might be expensive.

With regard to minimum wages to group " C " staff, planned increases in Tanganyika, expected Government action in Kenya, and a review by the East African Common Services Organisation involved a possible liability for which no precise estimate could be made. This year's expenditure on the harbours of £3,769,324 would be £176,207 or 5 per cent above that of 1960. In 1962, ordinary working outlays were estimated at £3,796,169, or £26,845 more than this year. The balance was precarious, and increased charges might have to be faced. Further contributions to renewals beyond the planned £2,381,844 this year and £2,427,757 in 1962 were necessary. Loan interest charges had risen from £2,779,909 in 1960 to £3,148,000 this year. In 1962, they would be £3,266,000. Mr. Mackay expressed concern as to whether present allocations in respect of loan reductions were large enough. In the next ten years loans of £28·25 million would mature, with 1969-71 as the critical years. For this year and next a sum of £200,000 for betterment funds in each period was below target.

Shortages of capital and betterment funds were limiting factors in the New Works programme. Track re-laying would cost £1·6 million this year with a further £2·1 million already authorised for later years. The jubilee of the old Uganda Railway to Kisumu, which reached there on December 20, 1901, had been celebrated by opening a new station. The major project scheduled for completion in 1962 was the Mnyusi-Ruvu link, providing the long-dreamed of rail connection between Dar-es-Salaam and the Northern Province of Tanganyika, and between Tanganyika and Kenya and Uganda. It had been decided to secure common stock to convert Tanganyika stock to airbrakes, and outlay of £325,000 had been sanctioned. Work would begin in 1962 on re-laying the Mwanza-Tabora line in new 60-lb. material, the first occasion in East Africa on which line will be laid from the onset with long-welded rails. A decision is likely in 1962 on whether the Kilosa-Mikumi line in Tanganyika will be extended to Kilombero Valley and the Southern Highlands, and more should be known about the practical possibility of extending the railway now building to Gula, Uganda, across the Nile to the West Nile. Funds in total so far committed were of the order of £11 million, and represented nearly the limit of practical internal borrowing.

With regard to finance for renewals, it was felt that capital needs must not be inflated to saddle the future with higher interest charges than could be met, but equally the future must not be prejudiced by insufficient renewals. No less than 800 units of rolling-stock still in service were over 40 years old, with another 1,600 at 35-39 years old, against the assessed economic life of a wagon of 35 years. Some 50 locomotives in full-time use had given five to ten years longer than their average assessed economic life of 25 years. A balance must be secured between maintaining old stock and renewing it, and this was highlighted by comparing fuel cost per hour of " 84 " Class diesel shunters (3s,02) and the " 13 " Class steam shunters (13s,86). Fuel cost of a single "90" Class main-line diesel-electric locomotive, assessed in 1961 for their first full year of operation, was 2s,50 per 1,000 gross ton-miles against 5s,50 for the majority of the Garratt steam locomotives. The Acting Commissioner foresaw the need for E.A.R. & H. to ask the World Bank for financial accommodation " in the relatively near future." In the difficult transitional political period, if Government aid was not forthcoming, it was unlikely that E.A.R. & H. would be able to pay enough to retain the services of quite a number of highly qualified and specialist officers, which would have the direst effect not only on E.A.R. & H. maintenance but on the East African economy as a whole. Mr. Mackay was concerned as to where the compensation money was to be found to meet payments as they fell due, and in particular where the money was to be found for that half not so far acceptable as being payable by the Government. He believed the " operative date " for starting of compensation would coincide with the December 9, 1961, date for change of Authority and setting up of the East African Common Services Organisation. That meant that in the calendar year 1962, also the E.A.R. & H. financial year, two instalments would have to be paid in respect of E.A.R. & H. designated staff.

Finally, Mr. Mackay declared: " I consider the basic state of E.A.R. & H. to be strong and healthy. We are going forward into the new organisation with railways and harbours which are paying their way and which by any standard are well equipped, well staffed and maintained. But there are some nasty rocks and shoals ahead and it is as well these should be recognised and charted. If they are recognised, and if the ship remains well crewed and found, then there is no reason why the voyage should not continue safely and beneficially for all concerned. But if the charts are incomplete and the navigation is faulty, or if the crew is too inexperienced and there be any lack of vigilance, the result could be shipwreck. I do not envisage this. I see no reason why it should happen. But equally I do not delude myself that a straightforward voyage lies ahead."

LETTERS TO THE EDITOR

THE EDITOR IS NOT RESPONSIBLE FOR THE OPINIONS OF CORRESPONDENTS

RAILWAYS INTO ROADS

October 30

SIR, Do your correspondents who advocate turning railways into roads really expect to deceive your readers by the arguments and statistics which they put forward ? According to "Crush hour travel," a Ministry of Transport publication (1956), the number of persons travelling between the central area of London and the suburbs from 5 p.m. to 6 p.m. by train is 528,900, which increases to a rate of 158,600 from 5.30 p.m. to 5.45 p.m. (equal to 634,400 an hour). It is this latter figure which any converted roads would have to provide for, or do your correspondents admit of exceptions ? Even this figure (634,400 an hour) is not the maximum with which London's railways can cope. St. Pancras, Euston, Marylebone, (and probably Kings Cross and Paddington), work well below capacity, because that side of London is not so congested, and there is no call for more trains. It would be small comfort for the man who lives in Croydon to be told that there was a spare seat on a bus going to Harrow. A writer hits on 12 miles as the average commuting distance (is it correct?); ignoring those who live beyond this point he says buses will start from the "twelve-mile post" and, including say, 16 stops and two turn-rounds, he proposes an average of 36 m.p.h. Comment is not necessary.

To seek to ameliorate the awful truth that buses and lorries need many more men to run them than trains, another correspondent seeks out a purely passenger-carrying concern, and compares the pay-roll with that of British Railways. The latter is a common carrier of all goods, maintains its own permanent way and signalling, manufactures its own vehicles, and provides amenities on its trains and stations, such as baggage facilities, waiting and refreshment rooms, dining and sleeping cars, first class travel, lavatories, and so on, things never touched by road transport. I believe these people know full well that it would not be possible to substitute say five 60-seater buses for a train with average loading of 300 passengers. At least twice the number would be wanted to cover fluctuations of service, and to cover the fact that the number boarding at each station is unlikely to equal exactly the number alighting. The same goes for freight: 20 15-ton lorries cannot substitute for an average 300-ton train. The average load of 15-ton lorries in service is more like eight tons, otherwise the pigs would have to be loaded with the sugar-beet and the milk tanks topped up with petrol. Clearly the number of men necessary is even more astronomic than at first was thought.

We are given figures, difficult to check, of the number of vehicles passing through some tunnel in the U.S.A. per lane, per hour, and we are asked to believe that the same number per lane could operate over all routes radiating from London Bridge in South London, and apparently this is to be done without providing for non-conflicting junctions. The contempt in which the future bus traveller is held is shown by the proposal to allocate only one lane each way to these vehicles, which will presumably mean that all will be all-station-stoppers, with stops between as well while the one in front clears. Do those people ever consult the Ministry's requirements for motorways, and motorways are essential if the bus speeds are not to be restricted ? Lanes must be 12 feet wide with a centre verge separating the directions of flow and with hard shoulders both sides. Let them calculate the number of lanes available again.

On October 24, near Luton, one car which ran out of control on the M.1 was sliced in half by another going in the opposite way. Commenting, experts stated that at speeds of 70 m.p.h. in rain the tyres of a car can lose contact with the road, and if the steering-wheel is turned the driver can easily lose control. If point to point running times equal to modern rail transport are to be achieved by road buses speeds of at least 90 m.p.h. will be required. Will Brigadier Lloyd and his few supporters say whether they consider the lives of the passengers would be as safe in these buses as in the French electric train which achieved 136 m.p.h. on the same day as the above accident ?

Yours faithfully,

R. G. R. CALVERT

45, Woodwaye,
Oxhey, Hertfordshire

RAILWAYS AND THE CLERGY

Octo ber17

SIR, Mr. A. D. F. Howard's points on sympathy between clergymen and railways are interesting, but that sympathy was in full flush even when churches were filled and railways were paying dividends. One recalls such figures as the Rev. W. J. Scott among the great Victorian amateurs. From pre-school days I mind a modest country parson who taught us Church History, beginning like this:—

"Life is like a railway journey. Before you start out, it's as well to read the Bye-laws and Regulations signed by the Company's Secretary, and for life's journey you should read the Laws of God in Scripture. For a railway journey you must get a ticket, and have it clipped, and for life's journey it is indispensable to be baptised and desirable to be confirmed. For a railway journey, you need a locomotive, and that must have a regulator, which is in the dome. For life's journey, your body is your locomotive; its regulator is in your head, and is called your conscience. A jammed regulator can cause very serious trouble. . . ."

There was much more, which to my shame I forget, except that on one's comportment during that long journey depended the sort of shape in which one finally arrived at its inevitable end.

Yours faithfully,

C. HAMILTON ELLIS

Southesk, Mannings Heath,
Horsham, Sussex

October 17

SIR, Although I cannot suggest a reason for the phenomenal interest of members of the clergy in railways referred to by Mr. Howard, I can confirm this from my own experience while Goods Agent at Oxford, when I was invited to address the members of the O.U. Railway Society and was the guest of the President, the then Chaplain of Keble College.

On this occasion the reverend gentleman amazed me by his wide knowledge of the types of engines working on various parts of the British railway system. The only explanation seems to me to be that many of the clergy travel extensively. Furthermore, in many instances they live near the railway and would doubtless become interested through their contact with railwaymen in their parishes.

It may also be of interest that there is at least one ex-Western Region Officer who entered Holy Orders on his retirement and had the distinction of being the only clerical member of my section of the Institute of Transport.

Yours faithfully,

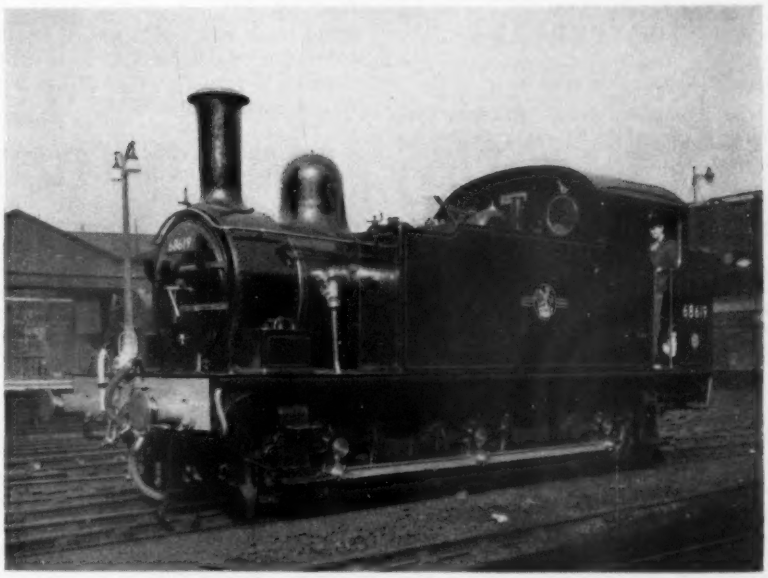
P. H. FISHER

56, Cressingham Road,
Reading, Berkshire

The Scrap Heap

"Grand old lady" retires

Locomotive spotters and railway enthusiasts will be sorry to learn that the "grand old lady" of Liverpool Street, a station pilot engine painted in the blue livery of the old Great Eastern Railway, was withdrawn from service on November 4. She has been engaged on shunting duties alongside her big sisters at Liverpool Street Station for the past two years, dressed up in this manner as a gesture by the Eastern Region for the benefit of enthusiasts. For the record—she is a Great Eastern Railway 0-6-0 tank, No. 68619, built at Stratford in May, 1904, to the designs of J. Holden, and classified J.69 by the L.N.E.R. She has 4-ft. driving wheels, weighs 42 tons 9 cwt. in steam, has a boiler pressure of 180 lb. per sq. in., a tractive effort at 85 per cent boiler pressure of 19,091 lb., and cylinder dimensions 16½ in. by 22 in.



Locomotive No. 68619 recently retired from service at Liverpool Street Station

60 glorious years

To give loyal and devoted service for 50 years is a proud achievement for many men. But 74-year-old Frederick Arthur Dean, who retired from London Midland Region, British Railways, last week, can look back on 60 years' service and, even more remarkable, at one station, Marylebone. Mr. Dean joined the former Great Central Railway in 1901 shortly after Marylebone Station was built, and apart from his service with the Middlesex Regiment in the First World War, he continued as a parcels clerk throughout his career. With the news that Marylebone Station may be rebuilt in a year or two, Mr. Dean will have served the railways almost the entire lifetime of the Great Central terminus. Mr. Dean refused promotion on many occasions so that he might stay at Marylebone for personal family reasons.

Beat the clock

An English visitor to Scotland has written to British Railways telling them of his experience of highland hospitality, particularly on the part of the staff at Mallaig Station, terminus of the West Highland railway line. Mr. H. W. Todd was touring Scotland by car recently when he saw a poster at Mallaig Station inviting motorists to send their cars by rail to Fort William. Mr. Todd did not relish the idea of motoring from Mallaig to Fort William, so he made inquiries. But the car-carrying train was due to leave in 13 minutes' time, and the next train was too late for Mr. Todd. The staff at Mallaig decided to try and get Mr Todd's car aboard a van and attached to the train in 13 minutes. And this is what happened: Mr. Todd rushed 400 yd. to where his car was parked; a van was prepared in the loading bay ready for him to drive on; the engine was uncoupled and sent to collect the van; a lorry was moved out of the way by porters; Mr. Todd got tickets for himself and his passengers—and they got aboard the train with one minute to spare.

50 years ago

The current issue of the *Great Western Railway Magazine* records an unusual occurrence. The Hereford-Severn Tunnel Junction circuit having been reported as intermittently disconnected and in contact on September 25, the usual measures were taken to determine the locality of the fault and it was eventually proved to exist in the Pontypool Road telegraph office between the test-box and the instrument. On taking the covering off the casing containing the wires, it was at once apparent that the trouble had been occasioned by mice gnawing the insulation from the wires, and further investigation resulted in the discovery of two dead mice that had evidently been electrocuted, one of them being actually found with the bare disconnected wire in its mouth. *From "The Railway Gazette," November, 1911.*

Cold comfort

I am not as happy as you might think at the news that a group of railway workers has taken over Nuneaton Station buffet from British Railways and are running it at a profit. It reminds me of a cold winter's evening some years ago when I had a long wait in a deserted station. There was a fireplace, but no fire, in the waiting-room, so I wandered up and down the platform to keep warm. Suddenly I came upon a little room filled with the cheerful glow of a roaring fire, where a kettle sang merrily on the hob and a man was sitting in an armchair reading a newspaper and eating hot buttered toast, with a fat, homely-looking tabby-cat purring on his knee. I stuck my head round the door and looked wistfully at the fire. The man looked up. "'Op it," he said. "This is the porters' room." Of course it may be different in Nuneaton. *Peter Simple in "The Daily Telegraph."*

Quicker by train

Asked why he had robbed the same place five times, a finally captured thief said: "I have a heart condition and cannot run far. This office is near an Underground station. *From Punch.*

Royal prerogative

Princess Alexandra, recently in Hong Kong, turned her hand to engine driving last week. She stopped the train in which she was travelling and took over the driving controls from the surprised driver. The officials who had left the train to attend the Princess, joined in a mad scramble to re-board it when she pushed the throttle open.

OVERSEAS RAILWAY AFFAIRS

FROM OUR CORRESPONDENTS

SWITZERLAND

Tunnel at Baden

The Swiss Federal Railways has recently brought into use a double-line tunnel under part of the town of Baden, on the main line from Basle to Zurich, which is one of the busiest in the country. The original main line, which passed through a short tunnel (the oldest in Switzerland) just east of the passenger station, had several level crossings across main streets. These crossings interfered both with road traffic and railway operation. The former railway tunnel has been adapted to road use. The new tunnel, over ½-mile in length, and bored in a wide curve to the south, under the Schlossberg, emerges and rejoins the old route just short of the bridge over the River Limmat. The deviation will result eventually in the freeing of three level crossings to road traffic. The next stage of the railway work will be the complete reconstruction of Baden Station.

HUNGARY

Additions to rolling-stock

The Hungarian State Railways will have 220 diesel locomotives delivered during the current five-year plan. Of these, 52 will be of 2,000 h.p. and most of the remainder 600-800 h.p. Electric rolling-stock will be increased by the addition of 59 diesel-electric locomotives of which 30 would be of 1,400 h.p. with Ward-Leonard transmission.

EAST GERMANY

Danish ferry service closed

The Warnemünde (East Germany)-Gedser (Denmark) ferry service has been closed by the East German Government. The Danish ferry service on this route continues to run, carrying the international trains.

USSR

Diesel locomotive develops 6,000 h.p.

The Malyshev locomotive works at Kharkov has completed the first of the TE-12 series of locomotives. Claimed to be the most powerful diesel locomotive in Europe, it is constructed in two tandem sections containing two 10D100 motors with gas-turbine blowers, developing 6,000 h.p. It is designed to haul loads of 4,500 tons at speeds of up to 100 k.p.h.

Increased freight traffic

Freight carried by the Soviet railways increased from 1,300,000 to 1,504,000 million km.-tons during 1959 and 1960. During the first six months of this year freight turnover amounted to 771,500 million km.-tons.

CONCRETE SLEEPERS IN THE U.S.S.R.

Concrete sleepers with French doubly-flexible fastenings on Moscow-Leningrad line

INDIA

Brahmaputra Bridge girdering begins

Girder erection of the Brahmaputra Bridge was started on July 24 by the General Manager of the Northeast Frontier Railway. The superstructure consists of ten spans each 397 ft. in length and two approach spans of 105 ft. The estimated cost of the girdering is a little over £1½ million. The construction of the bridge is expected to be completed next year.

Operational improvements on the N.E.R.

On traffic-saturated sections of the North Eastern Railway, goods trains of from 80 to 90 wagons are now being run. This is probably a record for regular service on a metre-gauge system. These and other goods trains are also being speeded up and quick-transit services are now in operation between 38 pairs of stations. During March a record of 94 per cent punctuality of mail and express passenger trains was attained.

E.R. & N.R. two-tier sitting-sleeping car

A two-tier "sitting-*cum*-sleeping" coach is now running between Howrah (Calcutta) and Delhi on the bi-weekly air-conditioned expresses. It has 23 upper sleeping berths and seating accommodation for 85. A supplementary charge of the equivalent of 4s. 6d. is made for each berth in addition to a very small reservation fee.

ARGENTINA

Various services to be by contract

Tenders have been invited for the following services: operation of all remaining refreshment rooms, kiosks and bars; cleaning and disinfection of passenger coaches and goods wagons; loading and unloading of goods wagons; operation of sleeping cars; operation of dining cars; operation of railway printing shops; and operation of the sleeper creosoting plant of the Mitre Railway at Villa Constitucion. In all these cases, the railway staffs will be allowed preference if they offer the same terms as the best bid received.

Disposal of railways and installations

The next steps to be carried out will be the transfer of railway port instal-

lations and traffic to the Port Administration, and the transfer to the Province of Chubut of the lines from Puerto Madryn to Alto Las Plumas and Comodoro Rivadavia to Sarmiento; to the Province of Santa Cruz, the line from Puerto Deseado to Colonia Las Heras; and to the Province of Corrientes, the 60-cm. (2-ft.) gauge " Economic " branch of the Urquiza Railway. The repair shops at Spurr, near Bahia Blanca, will be transferred to private interests. These measures will result in a reduction of 7,500 million pesos in the railway deficit.

Closure of branches

The following branches have been closed: Ferreyra to Comechingones, General Mitre Railway; Palmira to Chapanay, General San Martin Railway; Maciel to Puerto Gaboto, Coronda to Gessler, La Pelada to Humboldt, La Pelada to Soledad, Puna to Santa Justina, Superi to Catamarca, and Km.12 to Tio Domingo, General Belgrano Railway.

UNITED STATES

German locomotives delivered

Krauss-Maffei A.G., of Munich, last month delivered six 4,000-h.p. diesel-hydraulic locomotives to the Southern Pacific and Denver & Rio Grande Western Railroad Company. The locomotives have been specifically designed for American freight operation, and are equipped with Maybach engines and Voith transmissions.

German locomotive for testing

A 4,000-h.p. diesel-hydraulic locomotive, 75-ft. 6-in. over couplers, with a pair of Daimler 16-cylinder, V-type diesel engines, which is at present under development, will be made available for testing by U.S. Railways. The locomotive is to be built by Henschel-Werke G.m.b.H. of Kassel.

In Brief

Belgium. The 1960 annual report of the Belgian National Railways shows a deficit of B.Fr.31·8 million. Passenger traffic rose by 0·7 per cent and freight traffic by 4 per cent.

British Guiana. A United Nations expert is now in British Guiana to advise on the question of closing the East and West coast railways which operate at a considerable loss.

Ceylon. The General Manager of the Ceylon Government Railways and the Permanent Secretary of the Ministry of Transport & Works visited China in July, in connection with the purchase of coaches and wagons out of Chinese aid funds. It is understood that 70 coaches and 700 wagons will be purchased at a cost of Rs. 25 million.

East Germany. The East German state railway system, Deutsche Reichsbahn, has ordered 500 tank and freight vehicles from the Belgian manufacturer, La Brugeoise et Nivelles S.A.

Italy. The Italian State Railways has asked Parliament to permit the abandonment of 1,600 km. of uneconomic lines and to approve increases in tariffs.

Mali. Russian technicians are surveying a new line between Bamako, the capital of Mali, and the existing Guinean railway which runs to Conakry on the Atlantic coast.

Queensland. The self-contained Cooktown-Laura railway system is for sale, complete with track, buildings, bridges, three wagons, and a diesel rail-motor. The line is 67 miles in length.

Sweden. When completed next year the C.T.C. system at Ange will cover 358 km. of track and 43 stations, making it the largest system in Europe.

United Arab Republic. Expenditure on railways during the 1960-61 fiscal year amounted to £E. 23·2 million (£E.1 = £1 0s. 6d.).

U.S.S.R. Trials have begun at the Tiflis locomotive plant of a T8 electrical unit. The unit is eight tons lighter than the N8 locomotive currently in production at Tiflis and has a maximum speed of 100 k.p.h.

West Germany. The private railway Kleinbahn AG, will cease rail operations on December 2, 1961.

PUBLICATIONS RECEIVED

Machinery's Technical Handbook For Engineers, Winter 1961-62. The catalogue of the Machinery Publishing Co. Ltd., National House, 21, West Street, Brighton, Sussex, contains a wide variety of technical works covering a large number of trades as well as text books for the engineering student. At the end the book is a list of authors and their works as well as a list of the " Yellow Back " series of inexpensive handbooks which covers a large variety of trades.

Machine Tools. Catalogue MT1061 is issued by F. J. Edwards Limited, 359-361, Euston Road, London, N.W.1. contains an illustrated list of the new and used machines. The range includes woodworking, as well as metalworking machinery and such equipment as chucks, dividing heads and vices.

Evershed News. A 20-page publication by Evershed & Vignoles Limited, Acton Lane Works, Chiswick, London, W.4. This house magazine, besides giving personal and internal news in the first part, contains some interesting descriptions of instrumentation as applied in various industries. The use of the various instruments made by the company is described in relation to the process which is also given a brief but detailed description.

Integron high-fin and low-fin tubing. A 22-page brochure, published by Imperial Chemical Industries Limited, Millbank, London, S.W.1. The publication forms at once a catalogue of the Integron heat-exchanger tubing and a guide to the use and methods of manufacture of both the high-fin and the low-fin types. The later portions of the publication give some useful tables of heat-transfer figures, conversion factors, and other data of assistance to the designer of calorifiers and heat exchangers.

Co-ordinate Table. A catalogue describing the Dowding Atlantic co-ordinate table with Ferranti electronic control is issued by Dowding & Doll Limited, 346 Kensington High Street, London, W.14. This table gives high accuracy to the positioning of work for drilling, milling, grinding and similar work. The measuring system synchronises with the hand-setting dials through the agency of a feedback circuit.

Tempered Rubber. Three new booklets have been published by Tempered Rubber Components Limited, P.O. Box 17, Warren Street, Sheffield, 4. They are entitled " Rubber and Industry," "Rubber and Railways," and " Rubber and Road Vehicles." They describe mouldings, extrusions, and fabrications in natural and synthetic rubber and uses of rubber bonded to metal in which this firm specialises.

Engineer's Cutting Tools. This booklet published by English Steel Corporation Ltd., North Street Works, Openshaw, Manchester, gives a large variety of information on the cutting tools used by engineers. It lists sizes, definitions, dimensions, speeds and feeds. It also contains some useful mathematical data.

ACCIDENTS ON BRITISH RAILWAYS in 1960

Accidents to passenger trains lowest since war, freight train accidents increased

THE report for the year 1960 by Brigadier C. A. Langley, the Chief Inspecting Officer of Railways, Ministry of Transport, showed that six passengers were killed in train accidents compared with only one in 1959. This increase was fortuitous; five passengers were killed in the accident at Settle, which arose from a combination of remarkable circumstances. The slide-bar of a "Britannia" class express engine drawing a passenger train fell off some 30 miles from the scene of the accident, and the crosshead and correcting rod came adrift and tore away part of the adjoining track as a freight train was approaching in the opposite direction. In consequence, the engine of the freight train was derailed and came into side-long collision with the coaches of the passenger train.

General trend

Taking the general accident trend as a whole, the most serious train accidents were those resulting from collisions or derailments. For passenger and freight trains these totalled 415 in 1960, against 416 in 1959. The number of accidents to passenger trains under these headings has fallen considerably and, was the lowest since the war. It was offset by an increase in the number of accidents to freight trains. The total number of train accidents was 1,175 in 1960, which compared with an average of 1,213 for the 15 post-war years, 1946-60. This total included 228 open-door collisions. There were 50 fires in passenger trains, compared with 47 in 1959.

Accidents caused by human error totalled 617 in 1960, or a slight increase over 1959. They amounted to 52½ per cent of the total of all train accidents. The report pointed out that these figures were too high, but this upward trend did not apply to those accidents which often caused the most serious casualties, namely drivers passing signals at danger and signalmen's errors. These two types of accident fortunately did not give rise to serious casualties in 1960, but there were eight accidents into which inquiries were held where the results might have been much worse.

Formal inquiries

Formal inquiries were held into 13 train accidents which occurred during the year. All the resulting reports have been summarised in *The Railway Gazette*.

Reference has already been made to the accident at Settle. In three cases—Borough Market, Waterloo, and Newcastle—side-long collisions suggested that a driver might have mistaken for his own colour-light signal one applying to an adjacent line. As the result of the Newcastle accident, several signals in this area have been re-fitted with spreadlight lenses. At Waterloo, a motorman questioned the integrity of the signalling. In consequence, thorough tests were carried out on the electrical inter-locking and signal and point controls. Everything was found to be in good order, and it was also found that it was impossible for a false electrical feed to be made to a signal accidentally.

One inquiry concerned severe arcing, causing dense smoke and acrid fumes in a tube train in the tunnel on the Central Line of London Transport between Redbridge and Gants Hill. The circumstances were very similar to those of an accident on the same line near Holland Park in 1958. The Redbridge arcing was traced to damage caused to a power receptacle box in a car in the train when it was in a depot on the previous day. The tests then carried out were inadequate and the car should not have been allowed to have gone into service. The action taken by London Transport following the 1958 case was reviewed, and, since the 1960 case, further precautions have been taken.

Multiple-unit electric failures

An inquiry was also held into the failures in multiple-unit electric trains, operating on a dual high-voltage system of 25 kV. and 6·25 kV. in the Scottish and Eastern Regions. Two interim reports have already been issued and a final report will be published in due course. The interim reports reviewed the lengthy and detailed investigations which have been carried out, and also the improvements and modifications to the equipment which have been made as the result of these investigations. The reports pointed out that the main objections had been achieved and that there was every expectation that multiple-unit trains would in future give an efficient and satisfactory service.

Though not the subject of formal inquiries, a number of other accidents were the subject of discussions or correspondence between the Ministry and the Regional Officers. These included several cases of collisions arising from block irregularities; in one such case, the signalman had carried on with his duties although he was suffering acute pain from a duodenal ulcer. There were also collisions where a signalman had failed to ensure that previous movements had been shunted clear of the running line. One collision was caused by a porter using a crank handle on the wrong point-machine; better methods of identifying point machines were now being used. There was an extraordinary case where a Down freight train had become derailed, and, as a result, the rodding and crank to some Up-line facing points became dislodged so that the driver of an Up train found himself suddenly but safely diverted from the Up Local to the Up Through line. There was also a case of irregular interference by a ganger with the locking of some siding points, which caused the derailment of a light engine.

Protection of engineering works

Muddles and misunderstandings in the arrangement for the protection of engineering works had been the causes of several derailments when trains ran into gaps in the track. As in previous years, there had been cases of drivers passing signals at danger and of derailments or collisions with buffer stops resulting from mismanagement of brakes and excessive speeds. Again, as in previous years, there had been cases of motor vehicles crashing through boundary fences or bridge parapets onto the line. There was one tragic case where the vehicle had fallen in the path of a freight train. Five of the vehicle's eight occupants and a spectator who gallantly went to the rescue had been killed.

In addition to the Redbridge fire already referred to, there had been two other fires in tube trains, both of a minor character. In one of these, protective plates, installed following the Holland Park fire in 1959, had prevented the fire spreading to the passenger compartment.

Two other fires, one in a tube train car and the other in a brake-van in the North Eastern Region, had been attributed to cigarette ends. In each case, the fire had remained quiescent until the opening of the doors admitted an inrush of air.

Failures of engines and rolling-stock

couplings, and broken rails, totalled 1,395 in 1960, compared with 1,271 in 1959. This represented a reversal of the downward trend of earlier years. The figures for engines and rolling-stock and couplings were slightly better in 1960 than in 1959, but there had been increases from 183 to 234 in the number of broken rails and from 101 to 178 in "other failures."

Other failures, totalling 178, had included 129 cases of flooding of the permanent and slips in cuttings, compared with only 22 failures of these kinds in 1959. These were directly attributable to the long period of heavy rain in the second half of 1960.

There had been several cases of "dewirements" of overhead electric traction systems. These had arisen from various causes including a broken insulator, badly adjusted or positioned fittings, and a fault in a pantograph. In each such case, the overhead traction wire had been pulled down.

Level crossings

The number of accidents at level crossings of all kinds had risen from 231 in 1959 to 242 in 1960; but the number of deaths had fallen from 28 to 25. Accidents at public level crossings with gates had totalled 157 or two more than in 1959. Ten people had been killed against nine in 1959. These had included three crossing-keepers. One of these fatalities had partly resulted from a diesel train driver's failure to keep a proper lookout. Several non-fatal accidents had arisen from irregularities by train-crews or signalmen. There had been only seven accidents at public crossings without gates, but this was four more than in 1959.

Occupation crossings

There had been 73 accidents at occupation crossings, the highest since the war, compared with 63 in 1959. At most occupation crossings there are no warning arrangements—nor is the railway obliged to provide them—and users must open the gates. The most common cause of accidents was lack of care by users, including failure to close the gates after use. Attention again was called to the need for farmers and others to notify stationmasters before seeking to drive heavy or awkward vehicles across the line. There had also been cases where the use of occupation crossings had increased so much in recent years that the installation of additional safeguards was becoming essential.

"Movement" fatalities to passengers totalled 37—three more than in 1959, but below the average for the last five years. Attempts to enter moving trains or undue haste to leave them had accounted for 7 fatalities, and the report called attention to the very rapid acceleration of diesel and electric trains, compared with steam trains. But the most common cause of death was still falling out of carriages.

Fatalities to railway servants

The number of railway servants killed in "movement" accidents had been 123, compared with 136 in 1959. Once more, the greatest number of fatalities had occurred through people walking along or standing on the line. Lack of vigilance had been the main cause. Fatalities to shunters had fallen from 22 to 13, and the 1960 figure was the lowest ever recorded. The report suggested that this improvement was due to the reductions in the number of sorting sidings and in the number of men needed to control wagon movements.

"Non-movement" accidents also showed some improvement in that only 20 people had been killed, compared with 24 in 1959. Special attention continued to be paid to accidents caused by electric shock from the overhead traction system. There had been three fatalities from this cause, all occurring because engine-men had climbed on high parts of locomotives.

Accidents to trespassers

Accidents to trespassers had continued. These had included children who had been struck by trains or electrocuted, or who had fallen from structures. The report pointed out that much could be done by education. In conjunction with the school authorities, a vigorous safety campaign was launched during the year.

Brigadier Langley concluded with a review of the year. He pointed out that an analysis of accidents and casualties since the war showed that constant attention to safety had resulted in a steady improvement. Total fatalities in 1960 had been less than half of those in 1946. All railwaymen could be proud of these achievements but more would be done to increase safety on the railways.

Automatic warning system

The provision of the Automatic Warning System (A.W.S.), colour-light signals, track-circuits, and block controls had helped to reduce accidents from passing signals at danger and signalmen's errors, but against other human failings few safeguards could be devised, and safety must depend ultimately on the integrity, initiation, and discipline of the railway staff. Accidents from such failings had been rising and there was clearly room for improvement.

The installation of A.W.S. had been disappointingly slow, because of the difficulty in obtaining equipment. Brigadier Langley hoped for better progress. Medical investigation into the problem of drivers passing signals at danger was continuing. Much information of potential value had been obtained.

The number of accidents at level crossings, particularly occupation crossings, still caused anxiety, the more so as there was always the risk of a passenger train being involved in a serious accident. At busy occupation crossings, action was needed beyond the statutory obligations imposed on the railways, and this called for co-operation between all parties.

Brigadier Langley hoped that the installation of lifting barriers with flashing stop lights at public level crossings would prove a success, but safety would depend on road users exercising the same discipline as they do at road crossings protected by traffic signals.

During the year there were several serious derailments caused by the running of short wheel-based vehicles at marginal speeds. Some speed restrictions had been enforced and special overhauls had been arranged. Brigadier Langley considered that the problem of running these and other four-wheel vehicles at high speed to meet modern traffic requirements needed further study.

ELECTRIFICATION PROGRESS

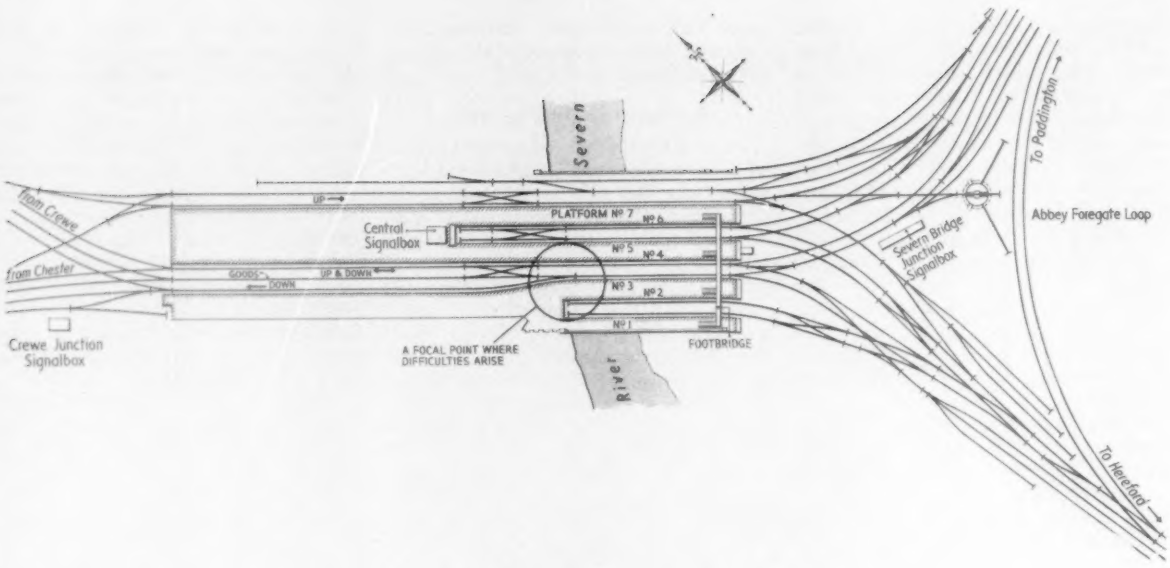
Hungary. Under the recently approved five-year plan electrification will be completed on the Budapest-Miskolc-Diosgyov line in northern Hungary. **Finland.** A committee appointed in 1959 to study the State Railways plans for electrification of about 1,000 km. of main-line track, has reported in favour of such electrification. **Norway.** With the opening of the three sections—Oslo-Laren, Honefos-Roa, and Alnabru-Grefsen—for electric traction, over 42 per cent of the Norwegian State Railways were electrified on a.c. system. **East Germany.** Electrification is being stepped-up and 75 km. of track are due for change to electric traction this year. **Japan.** The Japanese National Railways have allocated 133 million yen for electrification under its five-year plan. **Belgium.** Electrification of the Brussels-Query line to Paris will be completed in 1962.

BUILDING MATERIALS

The monthly list of new materials for November comprises a list of products to be shown at the Building Exhibition, Olympia, London, from November 15 to 29. Copies of the list are obtainable free from the Building Centre, Store Street, London, W.C.1.

DRIVERLESS TRACTORS AT PARIS GOODS DEPOT

Danzas Transport has installed eight electronically-controlled "Robotug" driverless tractors at a goods depot in Paris which is operated by the company in co-operation with the Société Nationale des Chemin de fer Francais. The tractors follow a magnetic field generated by a wire below the surface of the ground.



Layout of track at Shrewsbury before alteration

MODERNISATION OF SHREWSBURY STATION in the Western Region

The first stage, now completed, facilitates the movement of traffic in the area

SHREWSBURY, in the Western Region of British Railways, that unique station built on a bridge over the River Severn, is of considerable importance as the centre of many radiating lines. They are to: Wolverhampton, Birmingham and Paddington; Worcester, Gloucester and Bristol; Hereford and South Wales; Central Wales; North Wales and Chester; Crewe, and the Potteries and Stafford via Wellington. Traffic through this centre, both passenger and goods, is therefore heavy, especially in the summer months. The most urgent works required to facilitate the movement of this traffic have now been carried out as stage one of the modernisation scheme.

It will be seen from the first of the diagrams that previously delay was caused to through goods and passenger trains using the middle road between platforms 3 and 4 because the rear coaches of long expresses from West and South to the North, standing at platform 3, extended over the junction with the middle through road.

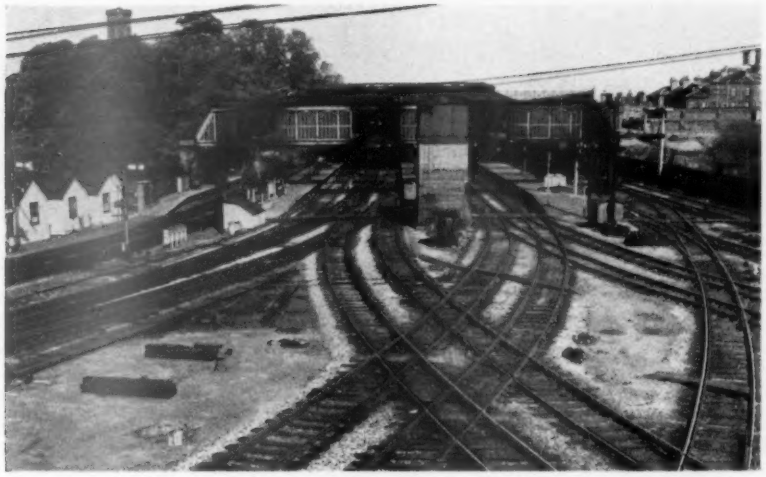
Before alterations, showing junction to Down main and Up and Down platforms

Traffic movement facilities

To obviate this delay the southern part of platform 3 has been sent back and the platform line extended as a third track throughout the length of the station. This has given direct access to platform 3 for trains from Hereford, leaving the middle road clear for trains from London or Bristol. Down London trains calling at both-ways platform 4 previously, had access to it by way of a slip connection in the double junction at the south end of the station. This access has now been achieved through a new crossover, situated to the south of Severn Bridge signalbox, clear of the station. The double junction has also been relaid.

Another alteration in the station has been the provision of a new crossover from the middle road to the No. 3 Down platform line to enable Down London trains to use that platform to the north of the new crossover.

To obtain adequate width platforms 2 and 3, and platform 1, and the bay lines between them, have been realigned.



Looking north after alterations showing independent access to Down platform from Hereford direction

The greater part of these platform reconstructions was either on the bridge over the Severn or on the immediate approach to it. The original platform construction was a concrete-filled trough floor resting on steel trestles. The new platforms are of concrete-trestle construction, with the exception of No. 1 bay platform, where the original construction over the bridge was retained and the remainder built with concrete blocks.

Hitherto, a passenger overbridge was situated at the extreme south end of the station and consequently was little used. It is intended that this will be replaced by a much more convenient one in the centre of the station near the existing subway.

Additional facilities now provided include an engine-standbye middle siding taking off No. 2 Up main line opposite Severn Bridge Box. Also one of a group of three sidings beside the Down line to Hereford has been converted into an engine line taking off the Up Abbey Foregate loop line.

The final phase of the engineering works was carried out over a period of three Sundays. The extensive signalling alterations involved, including the relocking of Severn Bridge box, the closing of the Central box on the station and alterations in Crewe Junction signalbox, entailed a three-week disconnection of the south end of the station layout. During that period 40 hand-signalmen were on duty throughout each 24-hour period under the control of Severn Bridge box by means of the Tannoy system. The 180-lever frame and associated connections at Severn Bridge Junction Box were renumbered and track-circuit locking of locks at facing points was installed. Colour-light signals have been provided as starting signals for platforms 5 and 6, and a colour-light signal with theatre-type route indicator for the Hereford line.

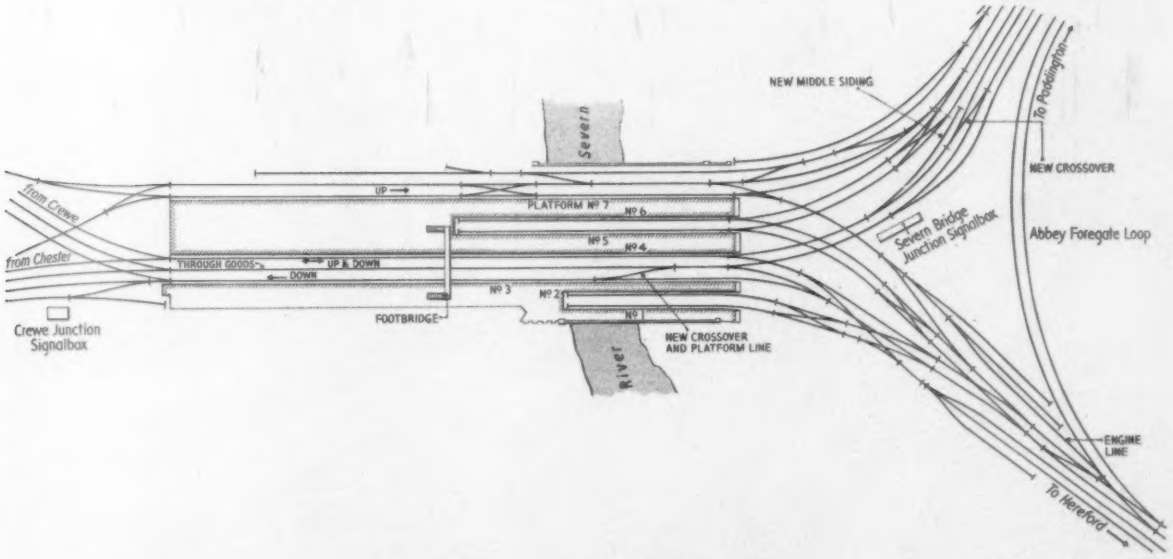
DIESEL LOCOMOTIVES, ROLLING STOCK AND ELECTRIFICATION

The first ten of the 150 Japanese electric suburban coaches for the Sarmiento Railway have been received in Buenos Aires. The remainder will be received before June, 1962. Acquired from the firm of Marubeni Iida, they were built by Kawasaki of Kobe, and are similar to those already in service. A repeat order of 200 coaches has been placed and will be fulfilled before the end of 1962. An undetermined number of these will be assigned to the Mitre Railway. Three hundred passenger coaches on order from Materfer, Fiat, Aerfer, and Ganz will be placed into service, 200 in 1962 and the remainder in 1963.

Negotiations are being carried out for the provision of 170 medium-gauge diesel-electric locomotives for the General Urquiza Railway which, together with the Sarmiento and San Martin Railways, will be completely dieselised before the end of 1962.

Contrary to previous announcements, the electrification of the Roca Railway between Buenos Aires, La Plata and Rio Santiago will be carried out; the final scheme has been approved and is waiting only the decision as to its financing.

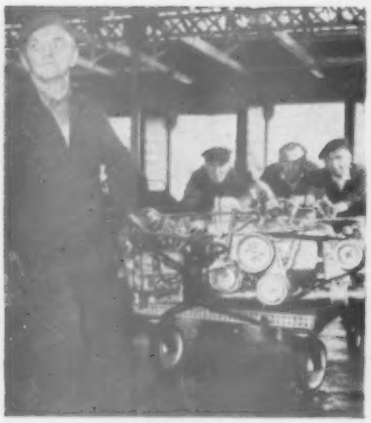
A plan for the elimination of 350 "critical" level crossings and their replacement by road overbridges or underbridges has been approved and will be carried out once the question of financing the cost of 4,500 million pesos has been solved.



Track layout at Shrewsbury after modernisation

Dundee Diesel Maintenance Depot

General view of depot



Depot-built diesel engine trolley

Cleaning a fuel injector

An old locomotive shed has been converted to maintain all the diesel-powered rolling-stock in the Dundee district. This includes 13 triple units, 17 twin units and various diesel shunters. Some servicing of diesel main-line locomotives is also carried out.

A staff of 37 is employed on motive power maintenance, and 29 on carriages and wagons. Two roads have high-level side inspection pits, and equipment includes an undercarriage washing machine; powered grease and oil guns; a powered oil dispenser, and lifting gear for engine changing.

Interior of maintenance shed

ELECTRIC RAILWAY TRACTION SECTION

A French electric traction group

ALL three constituents of the Matériel de Traction Electrique group in France can point to distinctive individual contributions to French practice in the construction of electric locomotives for the home railways and overseas. These are reviewed in an illustrated brochure issued by the group, in which is represented a large proportion of the French-built motive power for d.c. and a.c. systems which has attracted world attention by its performance and technical originality. The S.F.A.C. organisation (Société des Forges et Ateliers du Creusot—Usines Schneider) is the mechanical partner of the group. In its works was developed, in collaboration with the French National Railways, the two-axle motor bogie with low-level traction coupling which first appeared in the high-speed Bo-Bo locomotives Nos. 9003 and 9004, built to test French conceptions of lightweight four-axle design for the fastest traffic in comparison with the Swiss-built Nos. 9001 and 9002. Adaptations of this design are seen today in the numerous "9200" class 1,500-V. d.c. and "16000" class 25-kV. a.c. locomotives, as well as in 25-kV. locomotives for the Indian Railways. The later trend in France toward the single-motor bogie is likely to be seen in years to come as of equal significance with the previous break with the Co-Co tradition for express locomotives, and the same builder has a bogie design in this category which is used in the "9400" series of light mixed-traffic locomotives for 1,500 V. d.c.

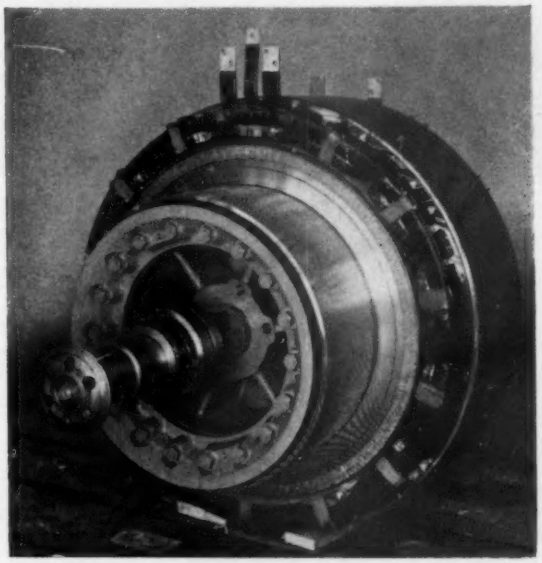
The name of Forges et Ateliers de Constructions Electriques de Jeumont is perhaps best known for the JH (Jeumont Heidmann) camshaft controller, developed for d.c. traction and now widely used for a.c. as well, such installations including underframe equipments in motor coaches for the 25-kV. Istanbul suburban system of the Turkish State Railways. The special requirements of a.c. traction are met by the production of transformers, excitron rectifiers, and a.c. series motors of high overload capacity obtained by a ventilation circuit designed for effective cooling of resistive connections between armature coils and commutator. Jeumont air-cooled rectifiers were used in the first 50-cycle main-line locomotive in the world to be equipped with mercury-arc rectifiers arranged to provide regenerative braking by operating as inverters. This was in the original Bo-Bo rectifier locomotive for the Savoy 25-kV. pilot scheme, converted for regeneration in 1958. As originally constructed, with multi-anode rectifiers of an industrial pattern, it was not possible to make provision, as in the other prototype designs, for a.c./d.c. working, or for electric braking. Space also imposed restrictions in the modified installation, in which separate pairs of excitron rectifiers are used for traction and regeneration.

The third constituent of the M.T.E. group whose products are reviewed in this publication is Le Matériel Electrique S.W., the licensee in France for the Westinghouse Electric Corporation and the Westinghouse Electric International Company. The world-wide interest in this company's development of single-anode, liquid-cooled ignitrons for locomotives is too recent to need elaboration, but it may be recalled that S.W. ignitrons are used in the traction and regenerative braking system of the locomotives supplied to India and China by the M.T.E. group, described in our issues of November 18 and May 6, 1960. More recently the company has been engaged on the production of silicon rectifiers for traction and supplied the installation in the dual-frequency S.N.C.F. locomotive No. 20103 (see our July 29, 1960 and June 2, 1961 issues).

Improving the power of old locomotives

A NOTABLE increase in the output of electric traction motors through technical improvements but without changing the outer dimensions or the temperature class of the units is reported by Asea, Sweden's leading electrical engineering industry and the world's largest manufacturer of single-phase a.c. traction motors. For one of the motor types, known as KJ 136, the output has been stepped up by 81 per cent over the past 35 years.

Originally designed for the D locomotives used by the Swedish State Railways, the motor had a rating of 610 kW.



and an output of 830 h.p. In three successive versions—the latest of which was launched in 1960 and known as KJD 137—the rating has been raised to 1,100 kW., and the output to 1,500 h.p. Maintenance costs have been gradually reduced.

Improved design has made it possible to lengthen in the intervals between commutator overhauls. For the first motor's delivered overhaul is made after 200,000 km. Several units of the next latest version have run for more than 1m. km. without re-grinding of the commutators. The fact that the motors are directly exchangeable has made it possible to replace the motors in old locomotives and thus make them perform considerably better than when they were delivered 35 years ago. For engines of the next latest version showing an improvement in output of 51 per cent above that of the original KJ 136, the electrical equipment and the mechanical part of the old locomotives are so amply dimensioned as to permit exchange of motors without any modification of the locomotives.

The latest version of the motor is principally intended for the comparatively new Dm and Dm 3 locomotives. For the latter, which is used on the Arctic "Iron Ore Line," a changeover to the new motor would mean an increase in output from 7,500 to 9,000 h.p., raising the tractive effort from 80 mili-ponds to 95 mili-ponds.

Outside of the recording and observation coach

PANTOGRAPH TEST COACH in the Eastern Region

Testing the overhead equipment to ensure improved current collection

To ensure that overhead electrification in the Eastern Region of British Railways is as near perfect as possible a new, fully-instrumented pantograph test unit—capable of travelling at speeds of up to 100 m.p.h.—has recently gone into service.

Developed by the Chief Mechanical & Electrical Engineer, Eastern Region, in conjunction with the Research Organisation of British Insulated Callender's Cables Limited, the two-coach unit will be used for testing the overhead equipment to ensure that the already good current collection is improved wherever possible.

Lines on which unit used

This test unit will travel on all parts of the Eastern Region where lines are, or are being, electrified—including the Liverpool Street-Southend line converted, last year, from 1,500V. d.c. to the British Railways standard high voltage a.c. system. In addition, the apparatus will test the overhead electrification on the North East London lines—also completed in 1960.

Another vital job for the new high-speed pantograph test unit is to ensure that the overhead equipment on the Fenchurch Street to Shoeburyness line and between Liverpool Street-Clacton/Walton is in perfect order when the electric service is ready to be brought into operation.

Technical details

The test coach is fitted with two pantographs situated one on each side of a central observation dome. One pantograph is insulated for running at 25 kV. and is fitted with a height gauge and accelerometer. The other pantograph is used for running on dead lines and is fitted additionally with dynamometers for measuring the contact force exerted on the overhead conductor. Loss of contact is measured by means of a 25 kV./110 V. transformer at the "live" end and by a 300 V. d.c. circuit at the "dead" end.

All signals are brought to an instrument console, fitted on shock absorbing mountings, below the dead pantograph. The console contains three low-speed and high-speed recorders giving 13 recording and event-mark channels. The console also contains power supplies, amplifiers, timer, and track-mark unit. The track-mark unit will enable the chart records to be marked either manually from the observation dome, or automatically from track reflectors by photo-electric means.

All recorder charts are driven indirectly at a speed proportional to train speed from a tacho-generator on one of the wheels of the coach. Recording is therefore carried out on a distance basis.

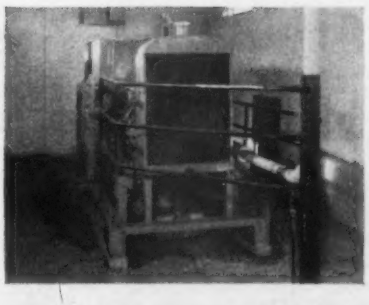
Two methods of observation

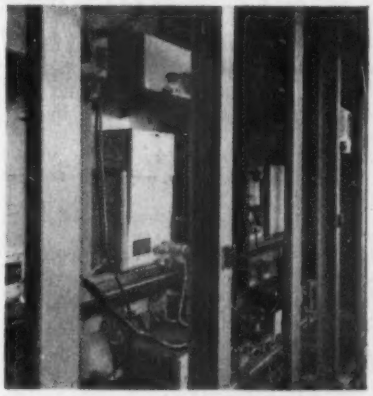
The coach has been designed to permit the detailed observation of specific overhead fittings, using the high-speed recorder, or general quality observation of lines for acceptance or maintenance purposes, using the low-speed recorders.

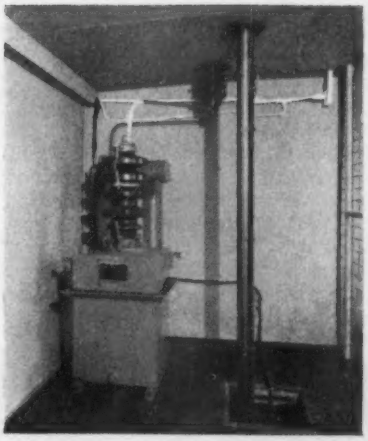
(Top right): Diesel-electric generator

(Centre right): Wiring of control panel

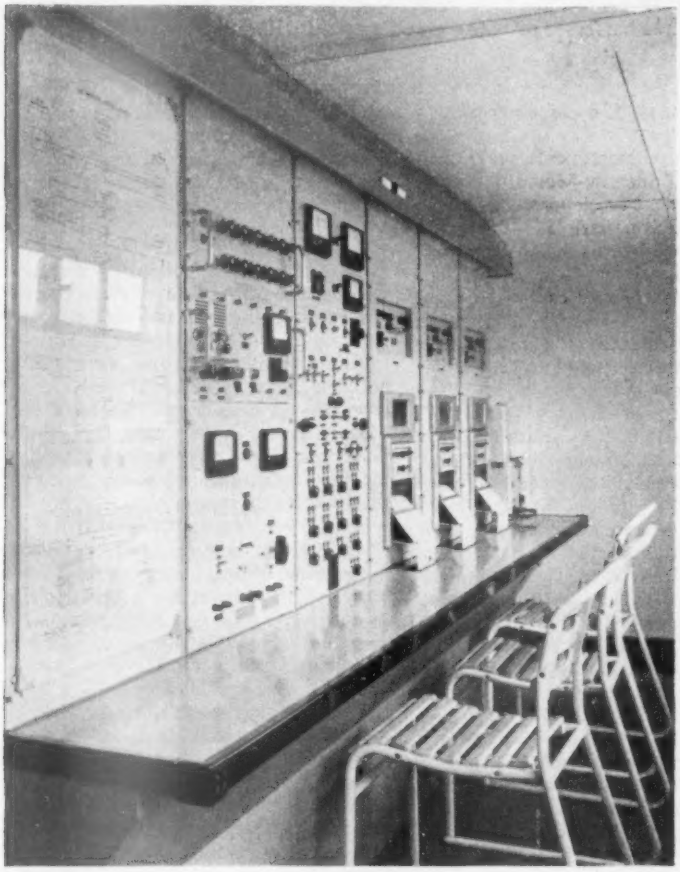
(Bottom right): High voltage potential transformer and height potentiometer



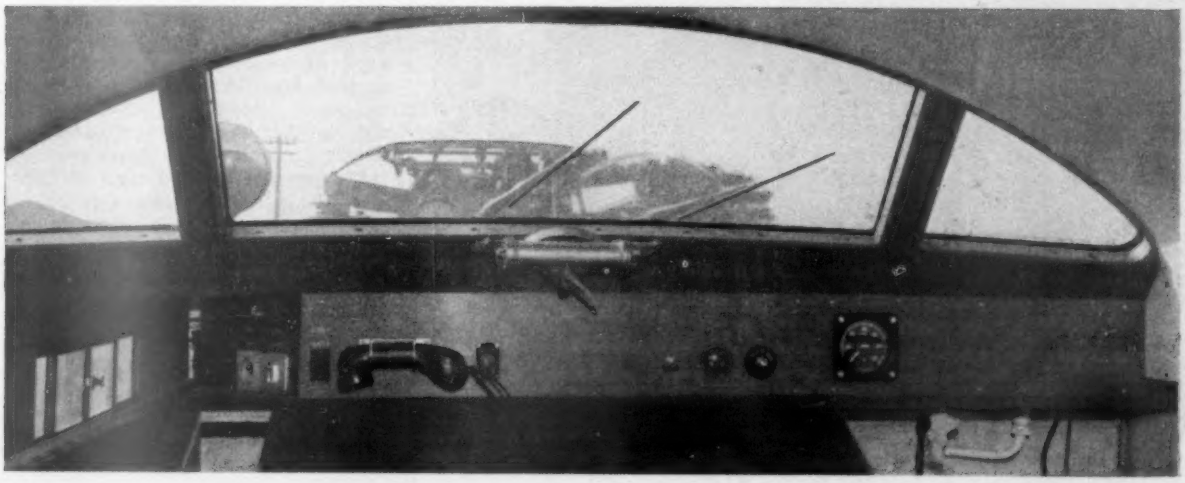




Control panel with low-speed electrical recorders



Pantograph from observation coach



CONTROL SYSTEMS FOR 50-CYCLE motor coaches

Development of equipment leading to a continuously-variable voltage scheme with automatic acceleration control

THE re-design of equipment made necessary by the adoption of 50-cycle traction gave the opportunity to approach motor coach control systems from a new angle. Certain steps toward the ideal of notchless acceleration had been taken in d.c. practice, but its attainment without rotating machines, such as the Metadyne, has only come with the replacement of resistance notching by the tapped transformer.

Existing designs modified

In the Lancaster-Morecambe-Heysham equipments of 1952, the number of voltage steps during acceleration was similar to that in contemporary d.c. schemes. In fact, in providing apparatus at short notice to allow maximum time for running experience, the English Electric Co. Ltd. modified existing designs as far as possible. The low-voltage tap-changer, for example, was made from a standard motor-driven camshaft power contactor group such as had been used by the company in 3,000-V. d.c. motor coaches for the Polish State Railways. At a later date, control by individual electro-pneumatic contactors with relay-regulated automatic acceleration was adopted, bringing well-tried d.c. motor coach practice into the a.c. field. This was a logical step in view both of the extensive experience gained with this form of switchgear in intensive suburban service, and the high proportion of such working embraced by the early stages of the British Railways 50-cycle electrification programme.

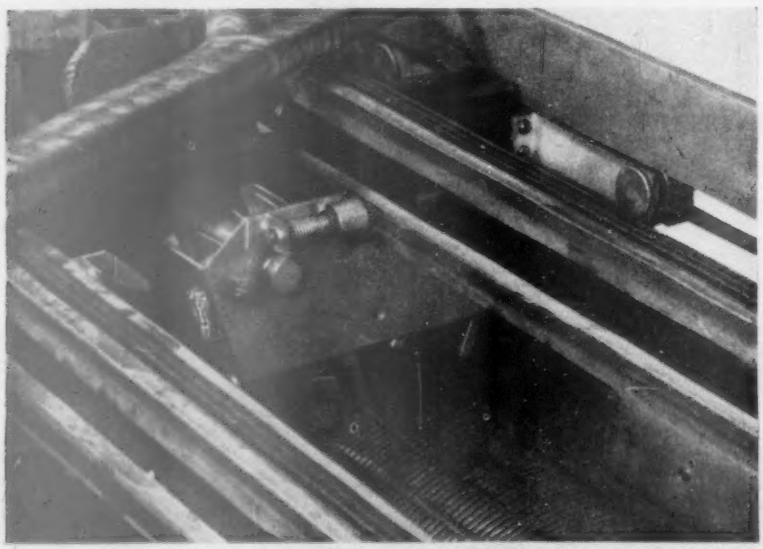
Equipment compartments were provided in the Lancaster-Morecambe-Heysham stock so that apparatus on trial should be readily accessible for inspection and adjustment, but the designs were suitable for eventual under-car installation. This applied both to the control gear and to the single-anode excitron rectifiers which soon replaced the multi-anode industrial units originally installed. From these experiments were evolved the English Electric equipments supplied for the 112 four-car sets built by British Railways for the Fenchurch Street-Southend electrification, and first employed for public traffic in 1959 on the Colchester-Clacton-Walton lines of the Eastern Region. This was the first rolling-stock built under the British Railways 50-cycle electrification programme to go into service, and was therefore equipped for dual-voltage (6·25 V. and 25 kV.) working with automatic changeover. A section of the catenary on the Colchester-Clacton route was electrified at 6·25 kV., to give the opportunity of testing this feature, and the trains were the first to operate in regular revenue service with the dual-voltage switching equipment.

Tap-changing in these trains is effected by electro-pneumatic contactors, and to provide a large number of notches economically it is arranged that the same contactors are used twice during acceleration.

Secondary winding

Each phase of the bi-phase secondary winding therefore consists of two sections, one with tappings and one without. On the first 12 notches only the tapped portions are in circuit, the number of turns effective in each being increased concurrently on each step. To form the 13th notch, one of the untapped windings is connected to each tapped winding, the notching contactors having opened in readiness for the sequence of closing to be repeated, but this time building up from a higher voltage because of the presence in the circuit of the untapped coils. These changes in the connections of the four-part secondary are made by a two-position air-operated camshaft with four sets of silver-butt main contacts and cam-operated silver auxiliary contacts.

The final notch is obtained by tapping the traction motor fields as in ordinary d.c. control practice. By these methods, 23 steps are provided in the full accelerating sequence with the use of 16 contactors plus the secondary grouping switch. Four of the contactors are concerned with the switching of two reactors which provide intermediate voltage steps between each main tap-change.



Part of the regulating transformer winding, showing one set of rollers

Silicon rectifiers

Forty-two further sets of equipment similar in principle but with silicon instead of mercury-arc rectifiers, were supplied later for additional multiple-unit trains. Meanwhile, it was agreed with the British Transport Commission that the last unit of the original series of 112 should be equipped experimentally with silicon rectifiers and a notchless control system, together with certain other modifications. Notchless control was obtained by using a continuously variable transformer for increasing the voltage between tappings. This made it possible to reduce the number of tappings on the main transformer secondary to eight, and to dispense with the previous method of switching in loading coils halfway through the sequence of acceleration.

The principle of notchless acceleration is shown in the accompanying diagram, which shows part of the main transformer secondary at S_1, together with two tappings. Another winding, S_2, feeds the regulating transformer, RT, from which a continuously-variable voltage which either assists or opposes that from the main tapping in use is applied to the injection transformer, IT. When contactor A is closed, the voltage across section X of S_1 is in series with that across the top half of the centre-tapped secondary of IT. The latter voltage depends on the positions of the moving contacts of RT, which consist in practice of pairs of rollers. At first this voltage opposes X so that no voltage is applied to the rectifiers. The rollers on RT are then traversed along the winding so that this opposing voltage is first reduced and then reversed, when the rollers pass each other, so as to assist X. At the end of the traverse the voltage fed to the rectifiers has been increased by the injection process until it equals that of the second tapping on the main transformer. In these conditions contactor B closes with no voltage across its contacts, and A opens.

The input connection to IT secondary is now reversed so that once more the voltage from the regulating transformer opposes that from the main secondary tapping (now due to sections X and Y of S_2), although the position of the rollers has not changed. The next traverse of the rollers now begins, so that in the same way as before the output voltage to the rectifiers is built up until it reaches the value of the next transformer tapping (not shown). This process is repeated until eight traverses have been repeated.

The scheme was developed in close association with Brentford Transformers Limited, the maker of the regulating transformer. This is an infinitely variable auto-transformer comprising in essence an edge-wound copper spiral surrounding a laminated core. Before winding, the copper is Class H insulated, and the insulation is then ground off along two straight tracks on opposite sides of the coil. An assembly of carbon rollers is in contact with each track. Starting from opposite end of the winding, they pass each other in the middle as described above, and a traverse is complete when each set has reached the end of the coil opposite to that from which it started. The voltage collected and supplied to the injection transformer varies in magnitude and polarity with the position of the rollers.

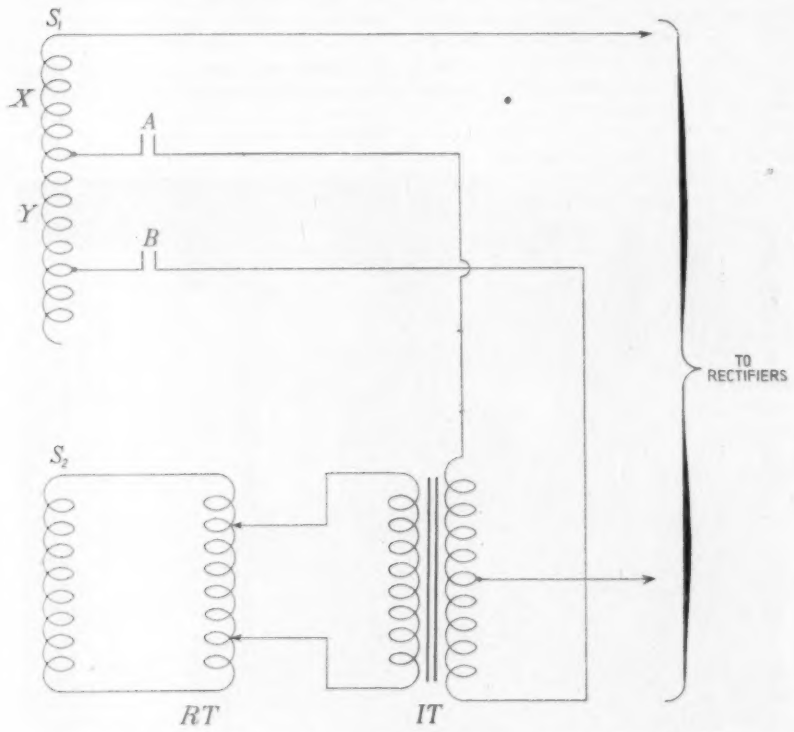
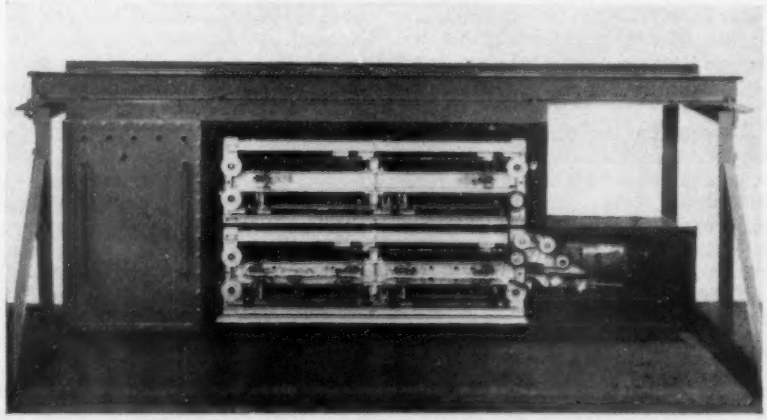


Diagram showing regulating and injection transformer connection for notchless acceleration of motor coach

Space limitations demanded that the regulator be installed horizontally beneath the motor coach, and the unit was therefore specially designed for this application, taking the form illustrated herewith. Plug connections are arranged at the rear of the regulator case for withdrawal purposes. In other respects the regulator conforms with the general range of Brentford stepless on-load voltage regulators as widely used in industry and in power distribution systems. In these units the assemblies carrying the roller contacts are operated by a chain drive running on ball race bearings, and the contact rollers are guided by supporting arms and assembled in self-aligning carriers, spring-loaded to maintain the correct pressure. When renewal is necessary, a contact assembly is removed by turning it away from the coil face and lifting it out of the carrier. The fact that the rollers revolve when traversing the coil face, in conjunction with appropriate contact pressure, results in negligible wear.

The speed of traverse is controlled so that the traction motors accelerate with constant current. This is effected by varying the impedance in the armature circuit of the pilot motor driving the regulator, using a magnetic amplifier system. The speed of the pilot motor is thus adjusted automatically to suit the conditions in which the train is accelerating, and times of traverse range from about 2½ sec. on level track to about 7½ sec. on the steepest up grade.



Brentford voltage regulator designed for underfloor mounting on motor coach

MODERNISATION OF POWER DISTRIBUTION to London Transport railways

Design of portable 1,000-kW. rectifier units and modernisation of 28 substations

by **H. L. BUCKMAN, B.Sc. (Eng.), A.M.I.E.E.** *Indoor Assistant to Chief Electrical Engineer, London Transport Executive*

AT THE conclusion of the war, it became necessary for London Transport to give detailed attention to the accumulated backlog of replacement of ageing and worn-out power-supply equipment, particularly in substations.

At that time, there were 87 substations supplying London Transport railways, both underground and surface lines. Of these, no fewer than 45 contained out-of-date plant, some 40 or more years old.

The most pressing need was to replace the old rotary converter units with modern static-rectifier plant, so designed as to be capable of easy and rapid installation in the event of breakdown of the old rotaries.

Portable units

In collaboration with contractors, designs were worked out for a portable 1,000-kW. unit comprising three single-phase transformers and four 250-kW. glass-bulb mercury-arc rectifier cubicles with means for inter-connection on both a.c. and d.c. sides virtually in "Meccano" fashion. The transformers were of an entirely new type, cooled by means of air blast on a closed circuit.

By sheer coincidence, a rotary converter in a heavily loaded substation—South Wimbledon—broke down just at the time when the first of these portable units had been manufactured. The new unit was therefore installed in that substation as a matter of urgency and was delivering current to the railway within three days of the breakdown.

Six of these original portable units were produced and have all rendered excellent emergency service in various parts of the undertaking. Three of them have since been installed, on a permanent basis, in the Chorley Wood Substation on the Amersham extension, and are shown illustrated on this page.

Design modified

Subsequently the design was modified to comprise two three-phase transformers per unit, with appropriate rectifier cubicles, either glass or pumpless steel, capable of being located in various ways, including on top of the transformers. Such an arrangement (with 1,500-kW. units) exists at the modernised Croxleyhall Substation.

In addition to the converting plant, it was also necessary to replace all the the a.c. and d.c. switchgear, and plans were therefore prepared for complete replacement of the whole of the plant in three of the most urgent substations, namely Surrey Docks, which had been badly damaged by bombs, Whitechapel, which contained original 1905 plant, and Bond Street with plant dating back to 1900.

Equipment installed at Chorley Wood Substation

At Surrey Docks the opportunity was taken to move to a new site with a building designed on the most economical functional lines taking full advantage of designs of plant which rendered the provision of a substation crane unnecessary. The rectifiers required no heavy foundations and the a.c. switchgear was of a metal-clad type occupying much less space than the old. The d.c. switchgear consisted of the high-speed breaker type, mounted on withdrawable trucks, and this occupied more room than the flat-back switchboard it replaced. Nevertheless the cost of this type of building was less than half that of the old design.

In other substations, such as Bond Street, space was saved by mounting the rectifiers on top of the transformers, and this assisted in the general re-orientation of plant in the modernised substation.

At both Bond Street and Whitechapel it was necessary to remove the old plant and install the new while still continuing to give full supplies of current to the railways.

Bond Street Substation

Bond Street Substation lies behind the ticket hall of Bond Street passenger station, which is in Oxford Street between Oxford Circus and Marble Arch, in a heavily built-up area with no room for expansion. Access from the street to the substation is normally through the station ticket hall, with heavy restrictions on the size and weight of equipment and material passing through it. These difficulties were overcome by opening an end wall and building, on temporarily rented land, a small annexe to house temporary switchgear, whilst at the same time the opening was used for taking away all the old heavy machinery. The restricted

space available in the substation itself also dictated that the design of the new plant should provide a considerable degree of flexibility in assembly and also temporary disassembly. A full account of the re-equipment of this substation was given in *The Railway Gazette* of May 7, 1954.

Whitechapel Substation is located alongside the District Line tracks, just west of Whitechapel passenger station, and there was no adequate access for handling heavy material either from the track or from the street some 16 ft. overhead. In this case it was possible to erect, over a small area at the end of the substation, a 12-ton gantry and pulley-block tackle serving vehicles standing at street level and all the equipment going out and coming in was successfully handled in this way.

The experiences at these two places were applied to planning similar wholesale replacement at other substations subsequently.

Remote control

All three of these modernised substations were equipped for operation by remote control, two from Aldgate, and one from Cromwell Curve. The work on this first stage had been completed and the manual operators all withdrawn by 1956.

The second stage of modernisation was then commenced, covering the complete re-equipment of Charing Cross, Moorgate, South Kensington, and Earls Court substations.

Charing Cross Substation

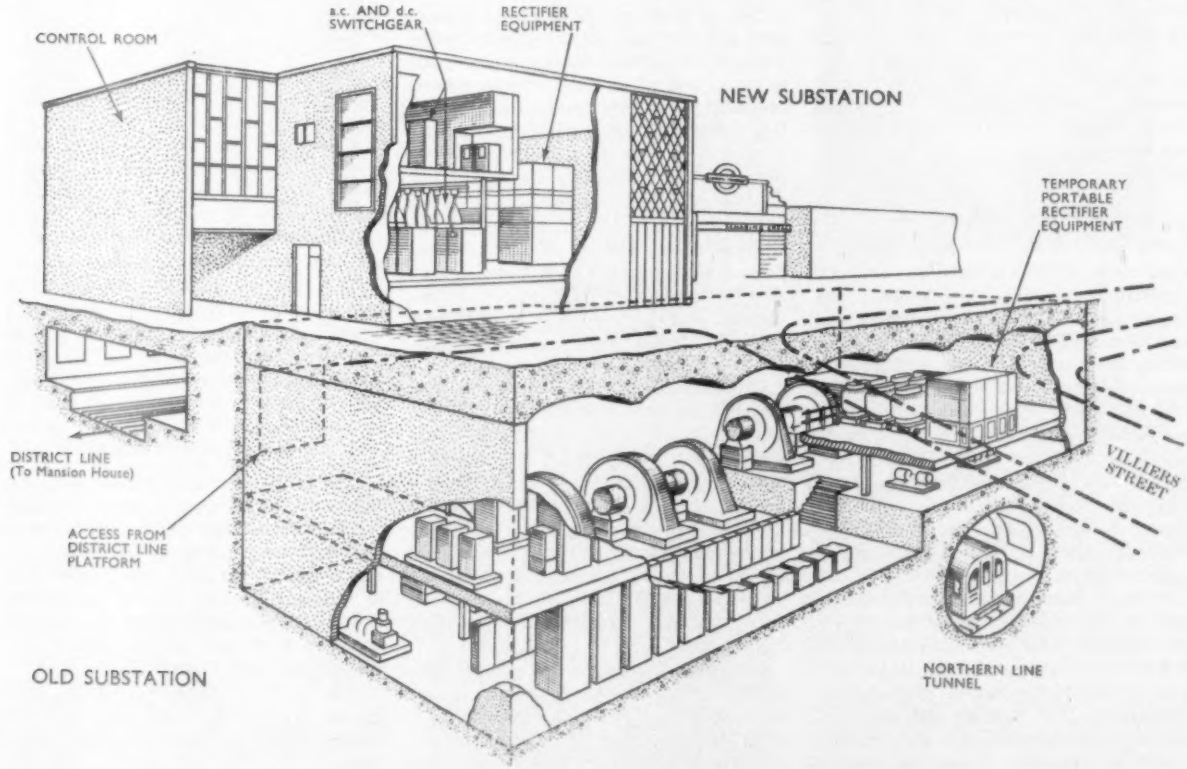
Charing Cross Substation, the largest on the Executive's system and containing 10,000 kW. of converting plant, was located completely underground beneath the pavement and embankment gardens adjoining Charing Cross District Line passenger station. The only access was from the eastbound passenger platform, and this presented so many difficulties in handling material into and out of the substation without interrupting normal current supplies to the railways that it became imperative to provide a building of special lightweight construction spanning the District Line tracks on the site previously occupied by the publicity-bill store. Equipment of the new substation with 9,000 kW. (and space for a further 3,000 kW.) of modern rectifiers and associated a.c. and d.c. switchgear then proceeded without hindrance and the plant became fully operative by early 1958. The relative positions of the old and the new substations are shown in the diagram below. A detailed description of the new plant was given in *The Railway Gazette* of October 11, 1957. This substation, which supplies three lines (District, Bakerloo and Northern), remains manually controlled although the building includes a control room for the ultimate remote control of this and a number of other sub-stations.

Moorgate Substation is located alongside the Circle Line tracks adjacent to Moorgate passenger station. Access for material had previously been from the tracks, but additions and alterations in the interim had virtually eliminated any reasonable chance of using this for re-equipping the substation.

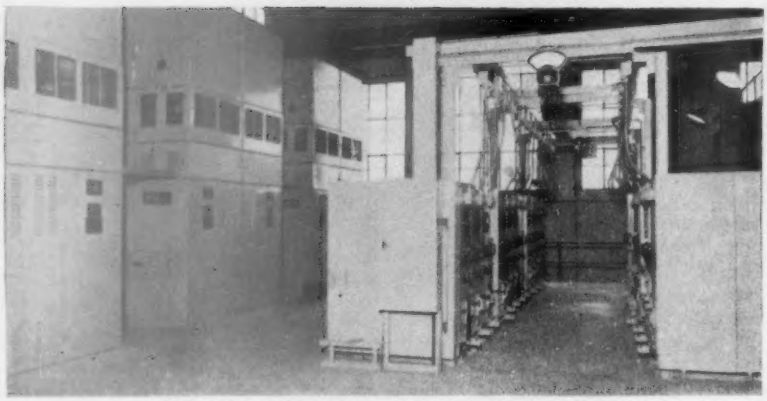
Temporary annexe

There was limited personnel access from the street in Moor Lane, some 16 ft. above track level. This was therefore enlarged and equipped with a 12-ton power-operated platform enabling all the old and new plant to be handled from the street. Also, in view of the heavy loading, it was necessary before removing any of the rotary converters to install in a temporary annexe one of the 1,000-kW. portable rectifier units. Re-equipment of main plant was completed early in 1960 and with the provision of remote control from Aldgate Control Room, the manual operators were withdrawn by mid-summer 1960.

The conditions in regard to access at both South Kensington and Earls Court substations were very similar to those at Moorgate, although rail access was still possible. Use of this was limited



General arrangement of old and new substations at Charing Cross



Rectifier cubicles at Croxleyhall Substation

to the three or four hours between the last train at night and the first in the morning, during which time parts weighing up to 15 tons had to be loaded on to a special train alongside the substation. At Earls Court, on one occasion, a total weight of nearly 60 tons was successfully removed in two nights. At both places it has been possible to provide limited facilities for handling from street level the lighter parts of the equipment.

Replacement of the main items of plant at both places is complete and the installation of the material for remote control from Cromwell Curve control room is well advanced.

At two other substations, namely Kilburn Park (Bakerloo Line) and Eastcote (Metropolitan Line), it was possible to replace the worn-out rotary converters with rectifier units made redundant by the scrapping of the South London tramways. The replacement of the associated switchgear is planned for the near future.

Accelerated modernisation

The year 1959 saw the introduction of stage three of modernisation, with the programme rapidly accelerated. This phase covered 13 complete substations and the completion of Kilburn Park, all to be carried through within three years. So far two substations (Croxleyhall and Hyde Park Corner) have been completed, and work is in hand at 11 substations, Acton Town, Baker Street, Belsize Park, Euston, Elephant & Castle, Finchley Road, Hounslow, Kentish Town, Kilburn Park, Northwood, and Willesden Green. Two of these are of special interest.

First, at Baker Street, where two substations have hitherto existed, one for the Metropolitan Line and the other for the Bakerloo, the two are being merged into one, located in the former Metropolitan substation. The building will also contain a control room for the remote-control of a number of other substations after modernisation.

Secondly, at Elephant & Castle a substation is being erected on the major roundabout-island site of the road scheme there, to a special design for the London County Council. This will replace the old substation which will be demolished as part of the road development plan. Work is in progress on the building and also the tunnelling works connecting with the two lines (Northern and Bakerloo) supplied therefrom. The substation should be in full operation next summer. The remaining substation in this stage is Chalton Street (Euston), where work is due to start in the near future.

Further plans

The completion of stage three next year will represent roughly the half-way mark of the present modernisation programme and plans have therefore been prepared for a further major stage, covering 15 more substations, at a rate similar to that for stage three. Work on this phase should commence about the end of this year, the substations involved being Bouverie Place, Canons Park, Golders Green, Harrow, Holborn, Ickenham, Lambeth, Liverpool Street, Mansion House, Neasden, Old Street, Putney Bridge, Ravenscourt Park, Russell Square and Stockwell, together with the completion of Eastcote.

One major factor in the modernisation scheme has been the frequency of the a.c. supply. Almost all the old substations have from their inception operated on 33⅓ cycles, which was the standard adopted by the predecessors of the London Transport Executive. In recent years substation plant has been designed to operate temporarily on 33⅓ cycles and ultimately on the national standard 50 cycles as and when such supply becomes available.

In some cases, such as Whitechapel, Surrey Docks, Moorgate, Charing Cross, and Elephant & Castle, it has been possible to cater for 50-cycle supply for the modernised substations from the outset from the Executive's own generating station at Greenwich with a consequent economy in cost of main rectifying plant. Even so, wherever the substation supplies Tube lines, e.g., Charing Cross, it is necessary, for statutory reasons, to maintain a supply for lighting purposes which is entirely independent of the main traction supply, and this has necessitated the provision of an additional supply from the 33⅓-cycle system.

In the large majority of cases the modernised substations are continuing to operate on 33⅓ cycles supplies from either Lots Road or Neasden generating stations, and the only change necessary for operation on 50 cycles when that becomes available will be the modification of motors for auxiliary services, such as fans, and of certain chokes and similar frequency-conscious items.

Where the main supply is at 50 cycles, the Signal Engineer's requirements specify that supplies for signalling purposes shall be at 33⅓ cycles. Where this is not available from Lots Road or Neasden, it is obtained from generators of the self-regulating type driven by 50-cycle induction motors.

Transistorised equipment

The system of remote-control of substations has undergone some change through the years. The first such system, installed in the early 1930s, was of the direct-wire type, which, although very simple to operate and reliable in service, was nevertheless extravagant in the number of cores required in the pilot cables.

In the late 1930s, a change was made to the supervisory type of control, using selective electro-magnetic equipment with telephone relays and a minimum of pilot wires, two at each substation. This system proved too slow in operation, and this was overcome by modifications in the control-circuiting and the use of four cores per substation, this has been the standard system since. Trials are about to be carried out using transistorised-electronic equipment, which should yield considerable economy in control plant, although still using at least four pilot wires per substation.

Replacement of cables

The modernisation scheme also involves the replacement of several hundred miles of distribution cables, most of it at 11 kV. but some at 22 kV. depending on the source of supply. These cables are in the main located on the Executive's railway routes and work has to be planned to fit in with the restricted after-traffic times mentioned earlier.

The work completed so far has cost about £3½ million, and that in hand represents £3 million. The new stage calls for a further £3¼ million, and the balance to follow will bring the total cost to about £13 million.

PERSONAL

British Transport Commission

MR. C. S. MCLEOD, Director of Industrial Relations, British Transport Commission, was invested with the O.B.E. on November 3.

MR. G. F. FIENNES, Line Traffic Manager (Great Northern), British Railways, Eastern Region, has been appointed Chief Operating Officer, Traffic Department, British Railways Central Staff, British Transport Commission, with effect from November 27.

MR. R. G. HENBEST, F.R.I.C.S., Estate & Rating Surveyor, British Railways, Western Region, who, as recorded in our issue of November 10, has been appointed Chief

Mr. R C. Henbest

Estate & Rating Surveyor, British Transport Commission, joined the Estate Office of the former South Eastern Railway in 1915, and was appointed Technical Assistant in 1927. In 1936, he took charge of development matters and acted as Personal Assistant to the Estate & Rating Surveyor. Mr. Henbest was appointed Estate Assistant to the Estate & Rating Surveyor, Southern Railway, in 1941, and Estate & Rating Surveyor, British Railways, Southern Region, in 1948. He became Estate & Rating Surveyor, Western Region, in 1951.

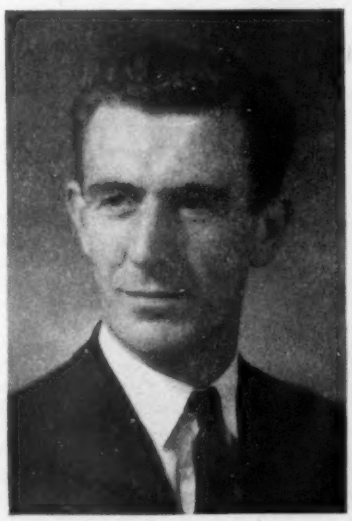
British Railways

MR. H. E. ROBERTS, Assistant District Traffic Superintendent, Redhill, British Railways, Southern Region, who, as recorded in our October 6 issue, has been appointed Traffic Superintendent of the Central Division, East Croydon, entered the service of the Southern Railway as a clerk at Waterloo in 1927. From 1928 to 1947 he held various

Mr. H. E. Roberts

posts in the London (West) District Superintendent's Office, both at Waterloo and Woking, and was then appointed Assistant Station Master at Waterloo. In 1950 he joined the office of the Superintendent of Operation and in 1954 he became Assistant to the District Traffic Superintendent, Woking. Three years later he moved to Redhill as Assistant District Traffic Superintendent.

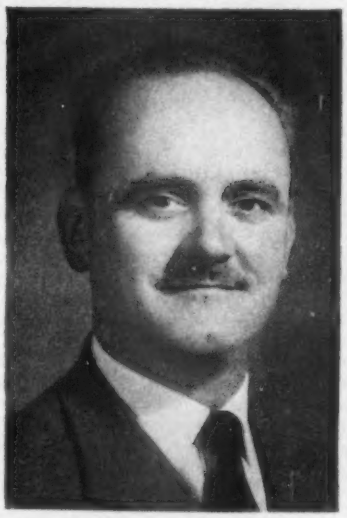
MR. J. E. DEWDNEY, Passenger Commercial Assistant, South Eastern Division, British Railways, Southern Region, who, as recorded in our October 6 issue, has been appointed Freight Commercial Officer of the Central Division, joined the Southern Region as a



Mr. J. E. Dewdney

cadet in 1948 after military service with the Royal Engineers. After three years' general training in all departments he was appointed to the Freight Rates Section in the Continental Superintendent's Office, Victoria, in 1952, and joined the British Transport Commission Traffic Costing Service in 1955. He served with the Southern and then the Western Region teams of the Costing Service until February, 1960, when he was appointed Passenger Commercial Assistant in the South Eastern Division of the Southern Region, the position he now vacates.

MR. C. W. EDWARDS, General Agent for Belgium & Luxembourg, Southern Region, British Railways, who, as recorded in our October 20 issue, has been appointed Assistant Commercial Superintendent, Shipping &



Mr. C. W. Edwards

Continental Department, Victoria, began his railway career with the former Great Western Railway in 1935, and gained experience in all branches of the Traffic Department throughout the Plymouth Division. Shortly after the outbreak of war he joined the Royal Engineers and was seconded to the Belgian Army in October, 1944, for liaison duties. On demobilisation in 1946, he returned to the G.W.R. for a short period before being transferred to the staff of British Railways Office in Paris in July, 1946. Mr. Edwards was appointed British Railways delegate to the Secretariat of the International Union of Railways in March, 1948, and General Agent for Belgium & Luxembourg in November, 1956.

MR. S. H. WICKS, Assistant Treasurer, British Railways, Western Region, who, as recorded in our September 1 issue, has retired, joined the former Great Western Railway Company in 1913 as a junior clerk in the Registration Office at Paddington.

Mr. S. H. Wicks

He was appointed Assistant to the Registrar in 1947 and, on the closure of that Office, was transferred to the Treasurer's Department, becoming Assistant Treasurer in August, 1951.

MR. S. C. HARVEY, M.INST.T., Assistant Commercial Officer, Paddington, British Railways, Western Region, who, as recorded in our November 10 issue, has been appointed Goods Commercial Officer, Divisional Traffic Manager's Office, Paddington, was educated at Reading School and joined the service of the former Great Western Railway in 1917 in the Chief Engineer's Office. He was subsequently selected for a period of special training under the original G.W.R. salaried staff special training scheme, and from 1926 to 1938 was attached to the General Manager's Office, latterly as private secretary to the late Sir James Milne. Mr. Harvey transferred to the Superintendent of the Line's Office in 1938, and in 1951 became Chief Clerk to the Divisional Superintendent, Worcester, subsequently moving to Oswestry as Assistant District Traffic Manager of the Central Wales Division. From 1949 to 1952, he acted as the Operating Member of the Regional Branch Lines Committee of which he subsequently became Chairman. In 1952, Mr. Harvey returned to Headquarters and occupied successively the posts of Assistant (Passenger & Parcels), Freight Development Assistant, and Sales Assistant. With the administrative reorganisation of the Region he was appointed Assistant (Commercial) to the Commercial Officer, afterwards redesignated Assistant Commercial Officer, which post he has now vacated.

Mr. S. C. Harvey

MR. W. YOUNG, Head of Traffic Section, District Passenger Superintendent's Office, Leeds, British Railways, North Eastern Region, has been appointed Assistant (Indoor) to the District Passenger Superintendent, Leeds.

MR. T. RIDLEY, Revenue Assistant (General), Chief Accountant's Department, British Railways, Eastern Region, has been appointed Internal Check & Audit Assistant.

Overseas

MR. J. M. DHARMARATNE, A.M.I.MECH.E., Divisional Transportation Superintendent, Ceylon Government Railway, who has been appointed Operating Superintendent, was born in 1914. He joined the Ceylon Government Railway in 1939 as a Probationary Assistant Transportation Superintendent and after completion of his training he underwent a two years course of further training and study in the Indian Railways from 1942 to 1944. He was appointed as Assistant Transportation Superintendent in 1944, in which capacity he had acted as Divisional Transportation Superintendent for short periods from 1951 to 1954 in the different Divisions. In April, 1954, he was appointed Divisional Transportation Superintendent.

Mr. J. M. Dharmaratne

MR. E. T. MCMULLEN, Acting Traffic Manager for the Orient, Hong Kong, Canadian Pacific Railway, who has been appointed Traffic Manager, joined the C.P.R. Freight Traffic Department in 1925. He spent ten years in Hong Kong, Manila, and Shanghai, and during the war served with the Royal Canadian Air Force. He returned to Hong Kong in 1945 on loan to the Ministry of War Transport of the United Kingdom for service with the Far Eastern Shipping Agencies Association. His experience with the C.P.R. also includes service with the Foreign Freight Department at Toronto, Seattle, and Montreal, where he was Foreign Freight Agent (Grain), from 1954 to 1961, when he became Acting Traffic Manager, Hong Kong.

Mr. E. T. McMullen

Industrial

MR. E. W. BERRY, Foreign Exchange Manager, Thos. Cook & Son Ltd., has retired.

MR. R. E. ANSELL has been appointed Sales Director, Henry Wiggin & Co. Ltd. MR. C. BOWLES has been appointed Sales Manager.

MR. R. A. WRIGHT has been appointed Technical Sales Representative, Cimex Limited, in succession to MR. R. FEELY, who has resigned.

MR. A. M. SIMMERS, Secretary, English Steel Corporation, has resigned. He is succeeded by MR. P. H. MORWOOD. MR. A. TAYLOR, Special Director, has been appointed Chief Accountant.

MR. T. L. KENDALL has been appointed Executive Director, Ruston group, and will control the London offices at Berkeley Square House. MR. J. G. BARBER, London Office Manager, has been appointed Export Area Manager, Eastern Bloc Countries, and MR. L. J. LAWRENCE has become Office Manager in his place.

Obituary

We regret to record the death in Buenos Aires, at the age of 97, of Engineer ENRIQUE CHANOURDIE, formerly Chairman of the Local Committee of the French-owned Province of Santa Fé Railway, Argentina.

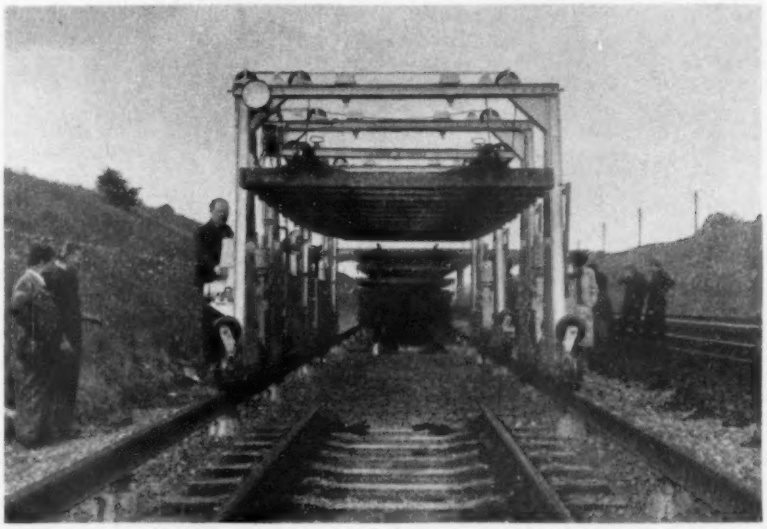
NEW EQUIPMENT *and Processes*

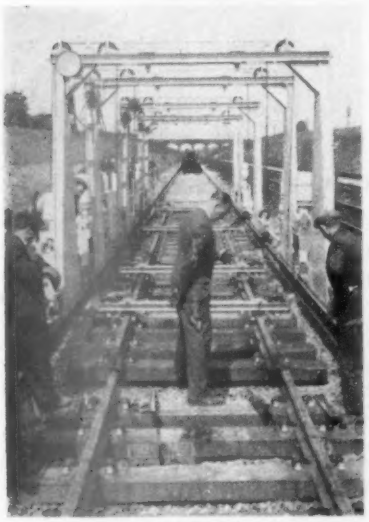
SINGLE-LINE TRACKLAYER

An "Arki-Endon" single-line tracklayer, which can be operated without possession of the adjoining line, has been put in use by the Eastern Region of British Railways. It has been adapted from a machine already in use on the Continent. It can be used under overhead wires on electrified sections.

The machine consists of five power-driven self-propelled portal cranes. Each portal is fitted with a lifting bale of three tons capacity. For travelling to site, two specially-modified "Sturgeon" wagons are used, the whole load being within normal loading gauge.

While travelling, the portals rest on their driving wheels on the wagon floor. On arrival, they are jacked up on free





wheels resting on rails laid to gauge on the wagon floor. A ramp and turntable are provided down which the portals are run, turned at right angles to the track, and lowered on their driving wheels. Another ramp takes them on the guide or service rails where they will operate.

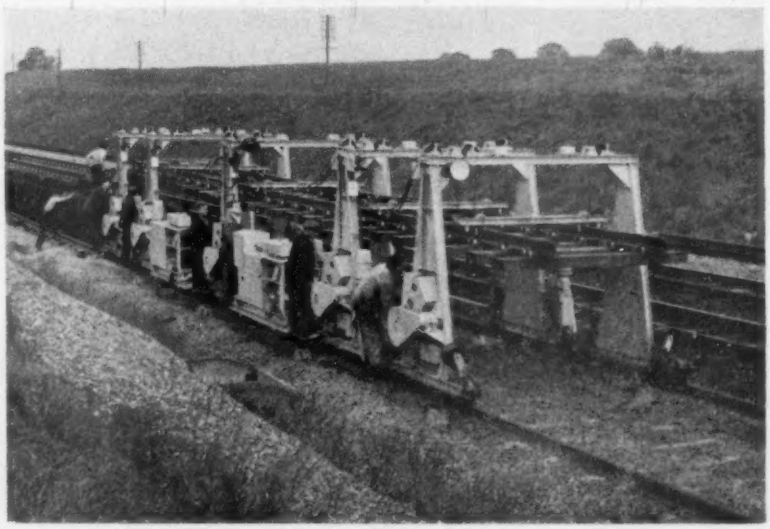
The guide rails used are the long-welded rails previously brought to site with which the track will be re-railed after the initial laying in of 60-ft. lengths of prefabricated track. These 300-ft. long-welded rails are lifted by seven small portals provided, to rest at, about 15-ft. centres, on special lifting and traversing jacks provided. The guide rails are laid 6 in. above the running rails to line and level by gauge, and anchored at 60 ft., with temporary fishplates. The appliance will lift 15 tons, can handle 60 ft. of concrete sleeper track, in three tiers, or four tiers of timber sleeper track loaded on "Sturgeon" wagons.

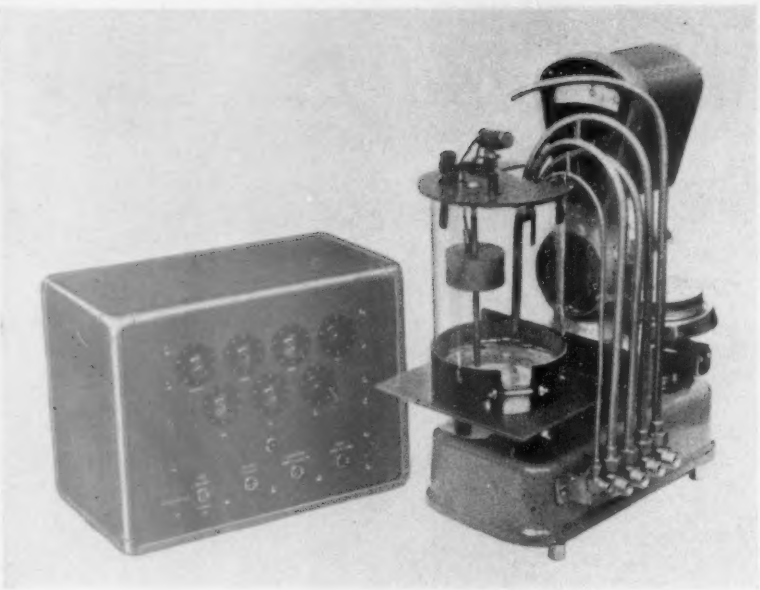
Further details can be obtained from Heinrich Arneke & Company, Seelze, near Hanover, Germany.

HYDRAULIC CABLE CUTTER

A cable cutter which can sever up to 2 in. outside diameter copper or aluminium cable in a total time, including assembly, of 60 sec., is powered from a new air-hydraulic pump developed by the same manufacturer. The cutter is separate from the pump, being connected by a flexible line, so that the pump need not enter confined areas. The blades of the cutter can be closed mechanically after the cable has been inserted, before the cutting pressure is applied hydraulically. The air-hydraulic pump used, known as the Porto-Power P 707, weighs 8¼ lb., has a 95 : 1 pressure ratio, and will accept a 10-ton load on a pressure of 180 lb. per sq. in. The equipment will work in any position, and can be used safely in any locality. If the air supply is cut off it will still hold the load, hydraulic pressure being released, only when the release pedal is kept depressed.

Further details of all the applications can be obtained from Blackhawk Limited, 12-16, Brunel Road, Acton, London, W.3.





STEEL SHELVING

Dexion steel shelves are now available in different strengths. The 12-in. and 18-in. widths are supplied in light and standard gauges, the 30-in. and 36-in. in standard and heavy gauges, and the 24-in. shelf is available in all three strengths.

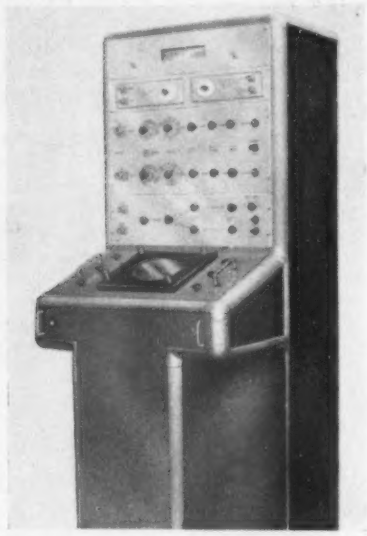
Further details can be obtained from the Dexion Group, Maygrove Road, London, N.W.6.

DIESEL ENGINE TEST GEAR

Two test rigs for use in diesel-engine test bays have been developed. The first is an automatic fuel-consumption measuring system. The second is an engine indicator. Between the two rigs a complete fuel-consumption test can be carried out. The fuel-consumption measuring device consists of an accurate scales unit of 4-lb. capacity having a centre zero. The pointer mechanism is fitted with a fuel-balance switch having contacts open on the heavy side and closed when the pointer approaches zero. A beaker is filled with fuel by a float mechanism and the engine draws from the beaker. The balance is weighed automatically so that the fuel weight before test is recorded, and the engine runs until a beaker full of fuel has been consumed. The weight is automatically removed and the cycle repeated. An electronic revolution counter and timing unit give figures in specific terms.

The engine indicator is a cathode ray tube incorporating circuits for various transducers. The full engine cycle measurements can be made from the screen, as well as injector-needle lift and fuel-line pressure. A standard camera fitting is provided to record readings. The indicator is self-contained and the controls are reduced to a minimum.

Further details can be obtained from Rotax Limited, Test Equipments Group, Chandos Road, London, N.W.10. This company has developed the rigs in conjunction with its associate, C.A.V. Limited.



POWER-OPERATED BULLDOZER

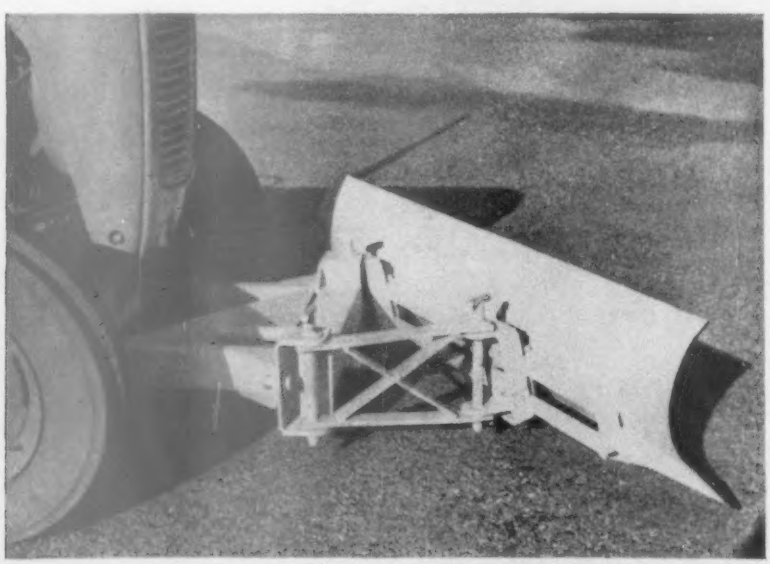
The model 35 Powerdozer is designed for operation by the Massey-Ferguson 35 tractor and to make full use of the capacities of this unit. The 5-ft. 6-in. blade is universally mounted with two alternative pitch angles interchangeable for levelling or excavating work. It can be offset on a sliding mount, up to 2 ft. on each side.

The blade is fitted with a hardened-steel reversible cutting edge, and is carried by a heavily-reinforced frame. Attachment to the tractor is at two points. The brackets are bolted to the front- and mid-mounting pads of the tractor and, once fitted, the subframe can be left in position without interfering with the normal operation of the tractor.

The blade-and-frame assembly is detached by removal of three handpins secured by linch-pins. The standard version is powered by a double-acting hydraulic ram mounted alongside the engine, finger-tip control being provided by a valve beneath the instrument panel of the tractor.

A utility version of the machine offers power lift and gravity drop by means of a mechanical link to the tractor lift arms. Control is by the position-control lever on the tractor quadrant.

Further details can be obtained from Bomford & Evershed Limited, Salford Priors, Evesham, Worcestershire.



Ministry of Transport Accident Report

Derailment and subsequent collision between Rugby (Central) and Lutterworth, British Railways, London Midland Region, on February 11, 1961

Colonel W. P. Reed, Inspecting Officer of Railways, Ministry of Transport, inquired into the derailment and subsequent collision between Rugby Central and Lutterworth, shortly before 3 a.m. on February 11, 1961. The 1.50 a.m. Down express freight train, partially braked, from Woodford to Mottram, became divided after the derailment of a wagon, and the rear portion came to rest with the leading wagon blocking the Up line. A few minutes later, at about 2.48 p.m., the 10.23 p.m. Up express train from York to Swindon collided at speed with the derailed wagon. The driver of the express train was trapped on the engine, which overturned. The driver received fatal injuries, and two passengers were slightly injured. The fireman, two other members of the train crew, and the guard of the freight train suffered from shock.

The accident occurred in open country, in the middle of a seven-mile stretch between signalboxes. Some minutes elapsed before, at about 3.15 a.m., the Railway Control and the police learned of the accident. Emergency services arrived with their customary speed.

The night was fine and clear, with a fresh breeze. It was dark at the time of the accident, but a quarter moon rose at about 3.15 a.m.

Signalling in section

The seven-mile section between Rugby and Lutterworth has intermediate block-section home and distant two-aspect colour-light signals on both Up and Down lines. They are controlled from the box in rear, and the lines are track-circuited from the signalboxes to the overlap points a quarter of a mile beyond the home signals.

The line is undulating with gentle curves. Between the points of initial derailment and subsequent collision, the line crosses the Oxford Canal.

The Class "D" express freight train comprised a type V.2 engine with 36 wagons and a brakevan. The vacuum brakes on the first 12 wagons were connected to the engine. The 23rd to 29th vehicles inclusive were a group of four-wheel, 12-ton pallet vans each with a 10-ft. wheelbase. It was the 26th vehicle which was first derailed. A mark on the track showed that this was half-way between Rugby Central signalbox and the site of the collision, namely, $1\frac{1}{8}$ miles from each. There were signs of damage to the canal bridge, where apparently the wheels of the derailed vehicle had jumped the rails from the six-foot to the cess side. For the last half-mile to the site there were signs of several vehicles having been derailed and having deviated on to the Up line. After the derailment, the freight train became divided, and the engine and first 25 wagons travelled on to Lutterworth without stopping.

The engine of the Up express collided with the first of the derailed pallet vans, the engine turned on its right-hand side, finally coming to rest 157 yd. ahead of the first point of impact. The tender and the first two vehicles were thrown into adjoining fields. Several more vehicles were derailed, but remained upright. Fortunately, the first three vehicles were not passenger coaches.

Driver's evidence

The driver of the freight train said that, after passing Rugby, his fireman drew his attention to a small flame which appeared for a second or two at wheel level some distance down the train on the off side. The flame did not appear again, and he assumed it arose from a hot box. He decided to stop at Lutterworth so that the guard could examine the train. He did not think it necessary to reduce speed. He had not specifically looked for the sidelights of the brakevan, and did not notice any snatch. He did not know that the train had become divided until he reached Lutterworth. He knew the maximum speed for his train was laid down at 50 m.p.h. After passing Rugby he had partly closed his regulator to avoid going too fast. Evidence showed that between Rugby and Lutterworth he had averaged 53 m.p.h. until he began to slow down for the stop.

The guard of the freight train said that he noticed nothing unusual until his brake van came to a stop—"an ordinary sort of stop but not in the ordinary sort of place." He went on the verandah of the van and looked out on both sides before getting his lamp to walk along the train. He then saw through the darkness that wagons were obstructing the line, and immediately afterwards saw the Up express approaching. He put his lamp to red and ran toward the train, but had only gone a few yards before it passed him to collide at speed with the obstruction.

He was sure that he had not heard any unusual noises from the train before his van stopped. The van was not unduly warm inside and he was fully alert. He agreed that the derailed pallet van must have made a lot of noise as it was dragged over the canal bridge, but said that brakevans themselves were noisy. He said that he thought only about 4 min. elapsed after he had stopped and before the collision. He had no particular sense of urgency at first, but did not consider that he had wasted time.

The fireman of the express train said that he thought the train's speed was about 60 m.p.h. He and his driver had seen the freight train guard's red lamp, but only just before the collision.

Rugby signalman's evidence

The Rugby Central signalman said that the Down freight train passed at 2.38 a.m. travelling at the usual speed of 45-50 m.p.h. On looking at his illuminated diagram at 2.46 a.m., he saw that the overlap track circuit on the Down I.B. home signal was clear, while the approach track circuit showed occupied. He therefore telephoned the Lutterworth signalman saying that there might have been a track-circuit failure or some vehicles might have been left on the line. A little later, the Lutterworth signalman told him that the train had arrived incomplete; and by this time he knew that the Up express train was overdue.

When asked what action he had taken to stop the Up express when he saw the abnormal indications on his diagram, he said he had not thought of the Up line being affected, and believed that he had a track-circuit failure; but he wanted to warn the Lutterworth signalman in case the Down train had become divided so that he would look more carefully for the tail lamp. It was pointed out to him that few if any of the track-circuit failures experienced by him during the past year were associated with train movements. He admitted that he had not appreciated to the full the implications of the warning which he had noticed from the track-circuit indications. Nor had he sent the Obstruction Danger signal at about 3.18 a.m. when the fireman of the express train arrived at his box very distressed

When he saw the abnormal indications, his proper course was to have sent the "Train Divided" bell signal to Lutterworth. In accordance with the Block Regulations, the Lutterworth signalman would immediately have had to stop traffic in the opposite direction, and he might have had time to put the Up I.B. home signal to danger before the express reached it.

The Lutterworth signalman confirmed having received the telephone message from the Rugby Central signalman at 2.46 a.m. The Up express had passed him at 2.44 a.m., and the Down freight train stopped opposite his signalbox at 2.47 a.m. He clearly appreciated the implications of the abnormal track-circuit indication, but as he had not received the "Train Divided" emergency bell signal, he did not feel it incumbent on him to take emergency action to put the Up I.B. home signal back to danger. He did restore the Down signals to danger to stop the freight train. By the time that he heard from its fireman that part of the freight train had been left behind, the Up express had passed the I.B. signals.

As regards timings, the evidence and calculations based thereon suggested that 3½ minutes elapsed before the Rugby Central signalman noticed the indication on his diagram; and that the rear part of the freight train, with probably three wagons already derailed, came to a stand at least 6½ min. before the collision.

Concerning the possible causes of the initial derailment, the train was travelling at 53 m.p.h. This was marginally in excess of its prescribed maximum speed of 50 m.p.h., but within the limit of 60 m.p.h. laid down for 10-ft. wheelbase vehicles at that time.

Inspecting Officer's conclusions

Colonel Reed thought that there was no obvious fault in the pallet van, which could have been detected on examination. The track was in good order. The speed of the train was not very much in excess of the prescribed maximum, and while the wheel loadings on this vehicle were unequal, they were not excessively so. He could only assume that the design of the pallet van was not adequate for the speed at which it was travelling.

Pallet vans, which are habitually marshalled in fast running freight trains, had caused the British Transport Commission concern because of the number of derailments of empty vans at speed, and since this accident had occurred a speed restriction of 40 m.p.h. had been imposed on all pallet vans while improvements were being made to the springing. A more rigorous standard of inspection and closer limits of wear had also been laid down, and research was being carried out into the changes necessary in the design of the springing.

Colonel Reed did not criticise the freight train driver for exceeding the speed limit to a marginal extent, but said that when his fireman drew his attention to the trouble at wheel level down the train, it would have been prudent for him to have reduced speed at once. He might then have felt either the drag of the derailed vehicles or the surge when the train became divided, and he might at least have been able to show a danger signal to the opposite line.

Colonel Reed was surprised at the freight train guard's failure to hear the clatter as the derailed wagon was dragged over the girder bridge, and equally at his lethargy during the 6½ min. which elapsed between his van coming to a stand and the actual collision. Had he been less lethargic he might well have advanced far enough towards the oncoming express train to warn the driver by showing his red lamp in time for the brakes to have been fully applied and before the collision took place. Colonel Reed was sure that the consequences would then have been much less serious.

The Rugby Central signalman is not criticised for his failure to notice the abnormal indications on his illuminated diagram sooner. But, when he did see them, he was at fault for not sending the "Train Divided" emergency bell signal. If he had, it was just possible that the Lutterworth signalman would have had time to put his Up I.B. home signal to danger before the express passed it.

The Lutterworth signalman was justified by rule in not trying to stop the Up express train after hearing only by telephone of the abnormal indications of the Down track circuits. But had he shown the appropriate initiative, it would, Colonel Reed is sure, have rebounded to his credit.

Colonel Reed suggested that this accident was a case where flares might have been valuable as a means of warning to the express—always provided that the guard of the freight train had acted quickly. This kind of equipment was under examination by the British Transport Commission, and two types of flare had been tested on January 11, 1961. Colonel Reed hoped that a decision to take flares into use would be possible soon.

Colonel Reed drew attention to a point made by the union representative at the Inquiry. Though severely shocked, the guard and fireman of the express had been allowed to travel back unattended to Swindon after the accident. Both were naturally anxious to get back home, but Colonel Reed said that they should have been given medical supervision and rest before making the journey.

London weekend

British Railways announced the introduction on November 17 of a new inclusive price weekend tour from the Netherlands to London. Passengers on these tours will board one of the British Railways' night boats at the Hook of Holland on the Friday evening, any time after 9 p.m. and arrive back at the Hook of Holland by 6.30 a.m. the following Monday. The price of the tour is 125 guilders, and tickets may be obtained at any travel agent or from Hudig & Pieters, agents of British Railways at the Hook of Holland. They cover second class return fares (supplement for first class travel 20 guilders), meals from breakfast on Saturday to dinner on the train on Sunday night, cabin berths, reserved seats and hotel accommodation, including all service charges.

European train services in 1962-63

The annual meeting of the European Timetable & Through Carriage Conference, this year representing 42 railway, steamship and restaurant and sleeping car administrations, was held from September 27 to October 3 in Brussels. By unanimous vote, the Swiss Federal Railways were elected to act as Managing Administration of the Conference for a further five years until 1966. At the meeting plans were agreed for changes in the train services, to operate during the summer of 1962 from May 27 to September 29, and from then during the ensuing winter until May 25, 1963. The more important alterations will be as follows.

Cross-channel services via Calais and Boulogne

As a result of the Southern Region electrification from Victoria via Folkestone to Dover, boat trains from and to London will be accelerated from 15 to 20 min. The connecting boat to the 9 a.m. from Victoria will leave Folkestone Harbour at 10.55 a.m., 25 min. earlier, and Paris will be reached 18 min. earlier, at 4.27 p.m. The Dover boat connecting with the ordinary 10.30 a.m. and Pullman 11 a.m. ("Golden Arrow") from Victoria, sailing at 12.50 instead of 1.5 p.m., will permit Paris arrivals 20 min. earlier than last summer for Pullman passengers (5.50 p.m.) and 12 min. earlier for ordinary passengers (6.8 p.m.). The afternoon service via Folkestone-Calais, altered this autumn from 2 to 3.30 p.m. from Victoria (1 hr. earlier during British winter time), will have a Paris arrival at 10.43 p.m., 15 min. earlier than now.

In the opposite direction the early service from Paris, now 8.18 a.m. and last summer 7.54 a.m. from Paris Nord, will start at 8.9 a.m., and the Victoria arrival will be 15 min. earlier, at 3.50 p.m. The midday service via Calais-Dover will be but little altered, as the trains will leave Paris 12 and 6 min. earlier than last summer (12 noon ordinary and 12.39 p.m. Pullman) and reach Victoria 15 min. earlier (7.35 p.m. "Golden Arrow" and 7.50 p.m. ordinary). But there will be a substantial improvement of the afternoon service via Boulogne-Folkestone, which had declined badly in recent years, but in future is to leave Paris Nord at 1.39 instead of last summer's 2.21 p.m., with a London arrival at 8.50 p.m., 80 min. earlier and an acceleration of 36 min. This will benefit in particular those wishing to travel beyond London after arrival. It is expected that the new Boulogne Ville station will be in use by the summer, and the Calais-Paris boat trains will call there instead of at the Tintilleries station as now.

Cross-channel services via Ostend

Departures from Victoria for the Dover-Ostend route will be daily throughout the year at 10 a.m. and 3 p.m., daily from June 30 to September 2 at 8 a.m., and nightly

from June 29 to September 8 at 11 p.m. The Belgian ships will leave Dover 20 min. earlier than hitherto, but the Ostend Quay arrivals will be 10 to 15 min. earlier only, except the night service, which will be due to reach Ostend at 5.15 instead of 5.45 a.m. At weekends at the height of the season relief boats will be provided at 11.35 a.m. and 4.30 p.m. from Dover to Ostend. New arrangements at Ostend will permit passengers for the international trains to pass from the steamers direct to the trains, in which passport and customs examinations will take place; this will assist in the punctual departure of the latter, some of which also will start earlier. Passengers for local destinations, as also those with registered baggage for Belgian stations, will pass through the controls at Ostend Quay as now.

Improved night services

The night service to Switzerland via Ostend will be improved. Train No. 39 from Ostend Quay, with sleeping car, *couchettes*, and through coaches for Interlaken, as well as through coaches for Basle, Chur, and Milan, will leave 18 min. earlier, at 9.10 p.m., and reach Basle at 6.21 a.m. In winter it will start at 8.40 p.m. and be in Basle by 6 a.m.; also in winter it will continue to connect with the 3 p.m. service from Victoria, as in summer, instead of (as last winter) with the 10 a.m. from London. This will mean a winter acceleration of 4 hr. 9 min. from Victoria to Basle by this route. Unfortunately it has not been found possible to arrange a similar winter speed-up in the opposite direction, and passengers from Switzerland will have to wait at Ostend Quay from 10.27 a.m. to 3 p.m. for the afternoon boat to Dover.

"Tauern Express" run extended

Increasing patronage of the "Tauern Express" (in connection with the 3 p.m. from Victoria), leaving Ostend Quay at 9.48 a.m. with through coaches and sleeping cars for Graz, Klagenfurt, Athens, and Istanbul, has led to the decision to terminate this train at Klagenfurt. Through coaches and a sleeping car will run in this train, for Innsbrück and Vienna, transferred from the "Ostend-Vienna Express." The latter, in connection with the 10 a.m. service from Victoria, is to leave Ostend Quay 23 min. earlier, at 4.10 p.m., and reach Cologne at 9.25 p.m., 30 min. earlier, and Frankfort at 12.9 a.m., 29 min. earlier; the Vienna arrival at 10.55 a.m. will be unchanged, as also the return working.

Of other services to and from Ostend, the German "T.E.E." train "Saphir" on its westbound run will start 15 min. later from Frankfort, at 8.10 a.m., and arrive 17 min. later at Ostend Quay, at 2.44 p.m., but will still connect with the 3 p.m. steamer to Dover; by acceleration between Dover and Victoria the journey from Frankfort, Liège and Brussels to London will be shortened by about 30 min.

Services to the Orient

Considerable alterations are to be made in services between Paris and the Near East. The "Simplon-Orient Express," which last summer took over the Rome sleeping cars from the "Rome Express" and began to carry passengers for beyond Milan only (with a relieving "Lombardy Express" for Milan) will next summer terminate at Trieste, and in future will be known simply as the "Simplon Express." The Paris departure and arrival times will be unchanged, but the journey to and from points in Italy will be slightly longer in each direction.

The Near East will be served instead by the "Direct-Orient Express," because of a desire by the Yugoslavian authorities to change the awkward times at which the present "Simplon-Orient" reaches and leaves Belgrade (11.19 p.m. eastbound and 4.59 a.m. westbound). The "Direct-Orient" will be the existing 12.5 a.m. from Paris Lyon to Milan, starting 15 min. earlier, and reaching Milan at 12.20 p.m. as now, Trieste at 7.58 p.m., and Belgrade at 8.46 a.m. the following morning. This train will include through coaches and a sleeping car from Paris to Belgrade, the latter extended three times weekly to Athens and twice weekly to Istanbul; there will also, as now, be *couchettes* from Paris to Brigue and Milan and a first class sleeping car and second class *couchettes* from Calais to Milan, in connection with the 3.30 p.m. service from Victoria. In the reverse direction, leaving Belgrade at 8.30 p.m., Trieste at 10 a.m., Venice at 12.43 p.m., and Milan at 5.15 p.m., the "Direct-Orient" will be the existing 6.29 a.m. arrival at Paris Lyon, but arriving 9 min. earlier at 6.20 a.m.

Accelerated timings

With the progressive electrification of the Paris-Strasbourg main line, the "Orient Express" has been steadily accelerated, and next summer will have another 30 min. speed-up, leaving Paris Est at 9.45 instead of 9.15 p.m., but unchanged in arrivals from Stuttgart onward. In the reverse direction, with unaltered departure from Strasbourg at 2.50 a.m., Paris will be reached 22 min. earlier, at 8.15 a.m. By last summer's decision to cut through-working of the "Arlberg-Orient Express" short at Vienna, this train also has lost its through facilities to and from the Orient, and will in future be known as the "Arlberg Express." Its summer formation from Paris will comprise first class sleeping car for Chur, and coaches and *couchettes* from Paris to Vienna; also, attached at Basle, a portion worked from Calais to Basle by Train "CB," including sleeping car for Innsbrück and coaches and *couchettes* for Vienna.

Car-sleeper services

Three through trains carrying passengers in *couchettes* and their motorcars, and with restaurant car facilities, will operate from and to Ostend Quay during the summer, in connection with the 12 noon car-ferry from Dover and the 1.45 p.m. from Ostend. One will run on Tuesdays and Fridays to Munich arriving at 8.30 a.m., and returning on Wednesdays and Saturdays at 9 p.m. A second will operate on Saturdays, and also mid-season Wednesdays, to Milan *via* Luxembourg and Basle, returning on Sundays and mid-season Thursdays. The third will be a new service on Mondays to Brigue, *via* Basle, Berne and the Lötschberg line, returning on Tuesdays. There is also to be a new *auto-couchette* service between Calais and Switzerland, the destination of which has not been finally decided as yet.

Certain timetable matters not settled at Brussels are being finalised at a further meeting in Barcelona during November. At the 1964 Conference, consideration is to be given to a proposal that future timetables should be agreed to cover a period of two years, instead of one year, and that this arrangement should operate first during the years 1965 to 1967.

Parliamentary Notes

Two-day debate for Transport Bill

Mr. Iain Macleod, Chancellor of the Duchy of Lancaster and Leader of the House of Commons, announced on November 9, that the proposed business on November 20 and 21 would be the Second Reading of the Transport Bill and Committee stage of the Money Resolution.

Barnard Castle-Penrith railway : petitions

Mr. H. J. Boyden (Bishop Auckland—Lab.) submitted to the House of Commons on November 9 two petitions objecting to the closure of the Barnard Castle-Penrith railway.

Questions in Parliament

Electrification of railways in Kent

Mr. John Wells (Maidstone—Con.) asked the Minister of Transport on November 8 what progress had been made with the electrification, under the capital development plan, of railway lines in Kent in the past year; and what improvements to railway fences were made at the same time.

Mr. John Hay, Parliamentary Secretary, Ministry of Transport, said that by last month all railway lines in Kent had been electrified, with the exception of the lines from Tonbridge and Ashford to Hastings, and the Isle of Grain branch, which were not included in the scheme for electrification. The fencing had been brought up to the standards required by the Chief Inspecting Officer of Railways.

Branch lines in Scotland

Mr. Hector Hughes (Aberdeen S.—Lab.) asked the Minister of Transport if he would give a general direction to the British Transport Commission to stop the closure of branch railway lines in Scotland, in view of the need for bringing industry, employment and population to the depopulated parts of Scotland.

Mr. Ernest Marples in a written answer said that, under the existing arrangements, the British Transport Commission submitted all proposals for such closures to the Scottish Transport Consultative Committee, which thus had an opportunity of assessing the factors.

Staff & Labour Matters

Railway pay claims

The claims of the three railway trade unions for improved rates of pay for railway salaried and conciliation staff, which were rejected by the British Transport Commission at a meeting of the Staff Railway Joint Council last month, have now been referred to the next stage of the negotiating machinery, the Railway Staff National Council. A meeting of this council has been arranged for November 23.

CONTRACTS AND TENDERS

£350,000 contract for railway sidings near Rotherham

Thomas Summerson & Sons Ltd. has been awarded a £350,000 contract by the Parkgate Iron & Steel Co. Ltd. for the supply and installation of complete railway sidings at an iron and steel works near Rotherham. The work involves 17,000 yd. of track and 90 turnouts.

Eight electronically - controlled Robotug driverless tractors have been installed by EMI Electronics Limited for Danzas Transport, at a new goods station in Paris, to speed handling between railway trains and road vehicles.

British Railways, Scottish Region, has placed the following contracts:—

Plasser Railway Machinery (G.B.) Limited: provision of two hydraulic track-tamping machines;

Murdoch MacKenzie Limited: earthworks in connection with reinstatement of Jerviston Junction to Merry Street, Motherwell; construction of underbridge at Merry Street, Motherwell;

Matisa Equipment Limited: provision of Matisa track recording trolley;

Richard Crittall & Co. Ltd.: installation of low-pressure accelerated hot water heating system in office building, Sighthill Freight Terminal.

The Export Services Branch, Board of Trade, has received calls for tenders as follow:—

From Greece :

2 complete weighbridges for weighing railway wagons, total capacity 100 tons, weighing capacity 50 tons.

The tender No. is 5280. The closing date is November 28, 1961. The Board of Trade reference is E.S.B./34376/61.

80 tyres for railcars and locomotives to S.E.K. drawing No. 23160/9-1

12 as above, to drawing 23160/2-1B.

The tender No. is 5276. The closing date is November 24, 1961. The Board of Trade reference is E.S.B/34375/61.

23 various types of oils and greases, including engine superheated, saturated, axle and gear box oils. Sodium greases for roller bearings, etc.

The tender No. is 5268. The closing date is November 24, 1961. The Board of Trade reference No. is E.S.B./34374/61.

9,000 kg. raw linseed oil

4,500 kg. boiled linseed oil.

The tender No. is 5234. The closing date is November 28, 1961. The Board of Trade reference is E.S.B./34371/61. The issuing authority for the above tenders is the Hellenic State Railways (S.E.K.), Purchasing & Stores Department, 34, Themistocleous Street, Athens, to which bids should be sent.

From India :

2 hand-shunting machines, petrol-driven, similar to Locopulsor shunting machine type 601.

The issuing authority is the Deputy Controller of Stores, Integral coach factory (Perambur), Ayanavaram, Madras-23, to whom bids should be sent. The tender No. is ICF/P9/OT/46. The closing date is December 11, 1961. The Board of Trade reference is E.S.B./34358/61.

From Pakistan :

72 sets of alkaline train-lighting batteries.

The issuing authority is the Chief Controller of Purchase, Pakistan Western Railway, Empress Road, Lahore, to whom bids should be sent. The tender No. is P-61/P2/6-61. The closing date is November 20, 1961. The Board of Trade reference is E.S.B./34628/61.

From South Africa :

2,500 sheets, 8 ft, 10⅞ in. x 4 ft. 11½ in. x 16 s.w.g.

1,000 sheets 8 ft. 10⅞ in. x 3 ft. 11½ in. x 16 s.w.g.

500 sheets 8 ft. 10⅞ in. x 2 ft. 8¾ in. x 16 s.w.g.

1,000 sheets 8 ft. 10⅞ in. x 2 ft. 6¾ in. x 16 s.w.g.

The above to be aluminium alloy flat sheet, to B.S.S. 1470/1955-N53-1/2H.

2,000 sheets 4 ft. 5¾ in. x 2 ft. 2½ in. x 10 s.w.g.

The above to be aluminium alloy flat sheet, to B.S.S. 1470/1955-NS4-1/2H.

The issuing authority is the Stores Department, South African Railways, bids should be sent to the Chairman of the Tender Board, S.A.R., P.O. Box 7784, Johannesburg. The tender No. is D.8869. The closing date is December 8, 1961. The Board of Trade reference is E.S.B./34644/61.

South African Railways has issued a call for tenders for the supply and delivery of 10,400 pairs of wheels and axles for railway goods wagons. A copy of the tender documents and drawings will be available for scrutiny at the offices of the South African Embassy, South Africa House, London, W.C.2. The Board of Trade reference No. is E.S.B./34325/61.

From Thailand :

49 items of steel superstructure for railway bridges.

The issuing authority is the Superintendent of Stores, State Railways of Thailand, Bangkok, to whom bids should be sent. The tender No. is S.2.Ghor/46700. The closing date is February 21, 1962. The Board of Trade reference is E.S.B./34090/61.

1 set colour-light signal installation at Bang Bamru Station, to the following specification:—

Signal: Colour-light signal with multiple aspects, route indicators shall be provided at the Signals C and M.

Switch point: A.c trailable type complete with inside detector.

Battery: Ample capacity to withstand 24-hour mains failure.

Charger: 2 units of charger of selenium type to be supplied.

Track circuit: A.c pattern, normally energised, and provided at every point.

Cables: Underground cables with rubber or plastic insulation, jute filled, typed lead alloy sheathed, bedded, armoured with steel, taped and served. Pot head, cable boxes, compound and accessories shall be provided, these cables will be used for signals, point machines, track circuits, as well as point indicator.

Power available: 220 V. a.c., 3-phase, 50-cycle.

The tender No. is 04385. The closing date is December 6, 1961. The Board of Trade reference is E.S.B./34063/61.

2 sets open-wire carrier telephone and telegraph (4 each) system, to the following specifications:—

Four single-terminal carrier telephone and telegraph equipment.

Distance between stations approximately 300 km.

One pair of 40 per cent conductivity 0·104 in. dia. copperweld has already been strung and transposed for 12-channel working. The characteristic impedance of the pair is 600 ohm.

Power supply available at each station is 110 ± 10 per cent V., 50-cycle, a.c.

Facilities required: 3 speech channels, 3 telegraph channels. Two-wire transmission. Type of signalling to be out-band ring-down working system complete with 20 c.p.s. ringing-current generator. Power supply to be interchangeable for 24-V. d.c. and 110-V. a.c. 50-cycle. Performance in accordance with latest recommendation of C.C.I.T.T., equipment must be fully transistorised and all components fully tropicalised. A full range of test equipment and protective units to be supplied. All components to be equipped in one bay side.

The tender No. is 04387. The closing date is December 12, 1961. The Board of Trade reference is E.S.B./34064/61.

50,000 rail anchors for 60-lb. rails as per drawing No. 1882-50.

The tender No. is 04398. The closing date is December 1, 1961. The Board of Trade reference is E.S.B./34065/61. The issuing authority for the above tenders is the State Railways of Thailand, Yod-Se, Bangkok, to which bids should be sent.

From Turkey:

609 complete wheels with steel tyres, bearings, etc. for wagons.

Specifications can be obtained from T. C. Derlet Demiryollari Isletmesi Merkez Alim ve Satim Komisyonu Reisligi, Malzemo Dairesi, Ankara. The closing date is November 20, 1961. The Board of Trade reference is E.S.B./34306/61.

Further details relating to the above tenders together with photo-copies of tender documents, unless otherwise stated, can be obtained from the Branch (Lacon House, Theobald's Road, W.C.1).

NOTES AND NEWS

Gleniffer Limited agreement. Gleniffer Engines Limited has appointed Towler Sales Limited as sole selling agents for the industrial application of the Gleniffer diesel engine.

L.M.R. goods depot to close. The London Midland Region of British Railways is to close Ashton-under-Lyne (Charlestown Goods Depot) from December 4.

Chipman changes address. The Chipman Chemical Co. Ltd. states that, from December 11, 1961, its address will be: Horsham, Sussex. (Telephone: Horsham 60341/5.)

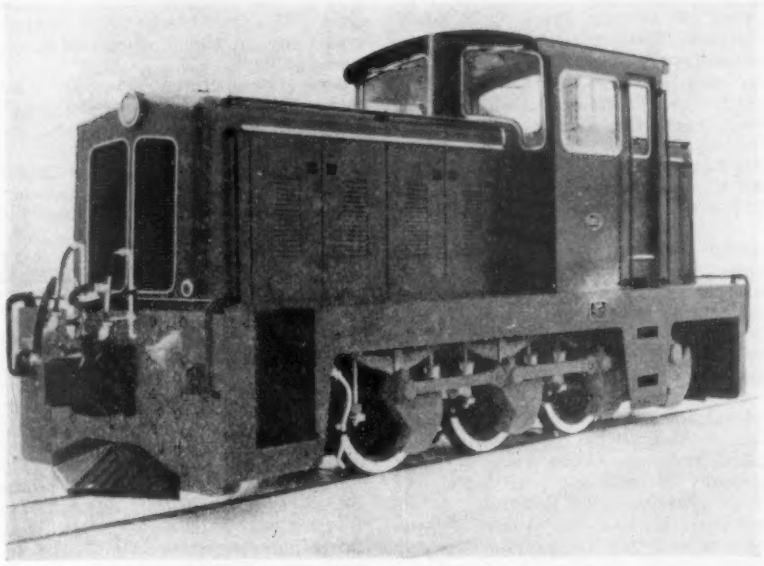
B.R.S. to abolish "carriage forward" facilities. British Road Services (Parcels) Limited is to accept traffic on a "carriage paid" basis only, from February 1, 1962.

Strachan & Henshaw Limited. Strachan & Henshaw Limited has moved its headquarters to an office building at Ashton Works, Ashton Vale Road, Bristol, 3.

Ruston group's London office. The Ruston group has acquired office accommodation in Berkeley Square House, Mayfair, London, W.1, to house its staff in London.

Exeter bus headquarters. The Western National Omnibus Co. Ltd. and the Southern National Omnibus Co. Ltd. have recently moved into a four-storey office block at National House, Queen Street, Exeter.

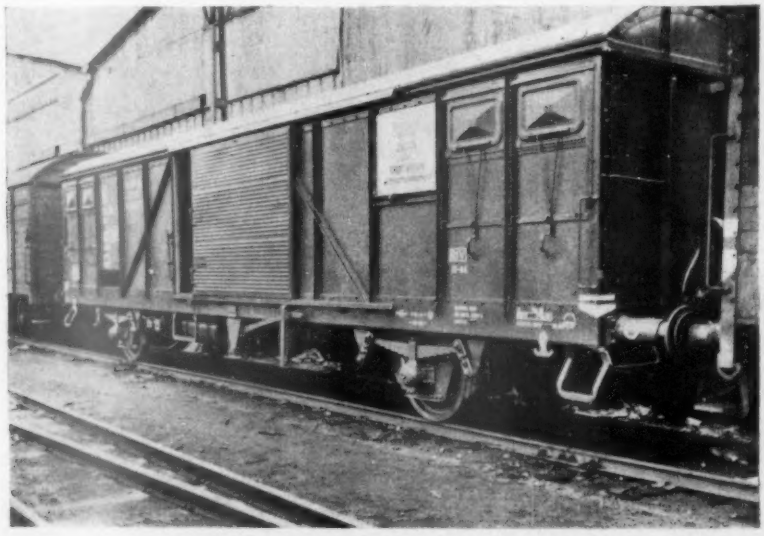
Rolls-Royce model at Indian exhibition. Among other exhibits at the Indian Industries Fair in New Delhi from November 14 to December 31, Rolls-Royce Limited is displaying a model of an 0-6-0, 350 h.p. diesel-hydraulic shunting locomotive designed and built by the Clayton Equipment Co. Ltd. The illustration above shows a locomotive of this type.



Diesel-hydraulic shunting locomotive with Rolls-Royce diesel engine

Associate of the Institution of Railway Signal Engineers. In the list of names entered on or transferred in the Register of Members of the Institution of Railway Signal Engineers on page 488 of our issue of October 27, the name of Mr. E. L. Argyle, Railway & General Engineering Co. Ltd., appeared as Mr. E. L. Akeyle.

Laminated construction of wagons. Railway wagons for Swedish Railways have been constructed of Presdwood, a laminated material made by Masonite Limited. The illustration shows one of these wagons carrying the exhibition stand for the Swedish exhibit at the Building Exhibition being held at Olympia, London, from November 15 to 29.



Swedish railway wagon constructed of Presdwood

Staff & Labour. In our Staff & Labour columns last week it was reported that there was an unofficial strike of train crews at five London Transport depots. The number of depots involved was in fact only two.

Mechanical engineer's change of address. The Chief Mechanical & Electrical Engineer of the Western Region of British Railways has moved his area office at Plymouth to Western House, Salisbury Road, Plymouth, telephone: Plymouth 62888.

B.I.M. conference. The British Institute of Management is to hold a one-day conference at the Connaught Rooms, London, W.C.2, on November 28. The shorter working week, its effects on productivity, the role of the employee, the implications for management, and the other problems that arise will be discussed.

Award for British Transport film. The British Transport Commission film "Terminus," one of the official British entry selected by the Association of Specialised Film Producers, has been awarded the Statuette of St. Finbarr for the best general-interest film at the Cork International Film Festival. "Terminus" earlier this year won the Grand Prix of documentary films at the Venice Film Festival, was also selected by the special jury appointed by the International Federation of Film Societies as the most interesting film for film society audiences shown during this festival.

Open forum. The North-Eastern Region, British Railways, has begun a new series of open forum meetings. The first was held on October 25, in the Jubilee Hall, Stockton-on-Tees. The chief speaker was Mr. K. A. Kindon, Traffic Manager (Tees-side), and he was supported in a brains trust session,

during which questions were answered from the body of the hall, by Mr. D. S. Lewis, District Commercial Superintendent (Middlesbrough), Mr. E. McClelland, District Operating Superintendent (Middlesbrough), and Mr. A. R. Jefferson, District Motive Power Superintendent (Middlesbrough). The Chairman was Mr. S. J. Judson, Chief Establishment & Staff Officer. The Deputy Mayor of Stockton-on-Tees, Councillor E. Temple, was present.

Merthyr-Pontsticill Junction service withdrawn. The Western Region of British Railways has withdrawn the passenger train service between Merthyr and Pontsticill Junction. Heolgerrig Halt and Pontsarn Halt have been closed but Cefn Coed Station remains open to handle parcels and freight traffic.

Bristol-Birmingham motorway. The Minister of Transport has appointed the Worcestershire County Council as his Agent Authority to carry out preparatory work on the extension of the Bristol-Birmingham motorway, M.5, to the outskirts of Birmingham, and later to supervise the construction. Mr. W. R. Thomson is the County Surveyor & Bridgemaster responsible.

Firth-Vickers expansion. The £4½-million expansion scheme recently announced by Firth-Vickers Stainless Steels Limited is a continuation of the company's policy of steady expansion. It follows a £2-million scheme to increase production of stainless-steel strip begun two years ago and now nearing completion. Since 1948, the company has spent about £1 million a year on increasing production capacity. This latest project will more than double production of stainless steel.

Railway Stock Market

Movements among foreign rails showed a number of small declines, due mainly to absence of demand; little selling was reported. Costa Rica ordinary stock has been marked down from 37 to 35½. Chilean Northern 5 per cent first mortgage debentures were 47½, and Brazil Railway bonds receded from 3¼ to 2¾. Guayaquil & Quito assented bonds have been marked down from 57½ to 55. Paraguay Central prior debentures remained at 18.

Antofagasta ordinary stock attracted buyers and at 16½ compared with 15¾ a week ago, though the 5 per cent preference stock, the yield on which is over 14¼ per cent, remained at 35½; the 4 per cent perpetual debentures were 40. Mexican Central "A" bearer debentures, however, gained half a point at 57½. San Paulo 3s. units kept at 1s. 9¾d. International of Central America common shares were again $13½ and the preferred stock $84.

Canadian Pacifics moved fractionally higher on balance at $43⅜; the 4 per cent preference stock strengthened from 59 to 59½, and the 4 per cent debentures strengthened afresh from 58½ to 58⅝. White Pass shares eased from $13⅜ to $13½.

Nyasaland Railways shares (11s.) were maintained compared with a week ago, as were the 3½ per cent debentures at 35. Midland Railway of Western Australia unified ordinary stock was 11, Emu Bay 5 per cent irredeemable debentures 39½ and elsewhere, West of India Portuguese capital stock was again 139½. Gedaref Railway & Development 5 per cent guaranteed debentures were quoted at 97½.

Among shares of locomotive building and engineering companies, Gloucester Wagon 10s. shares, after a sharp rise on the take-over offer from Winget, lost part of the rise at 12s. 9d. Wagon Repairs 5s. shares strengthened from 26s. to 26s. 3d., G. D. Peters have changed hands at 17s. 6d., while Beyer Peacock 5s. shares rose from 6s. 3d. to 7s. and Charles Roberts 5s. shares were quoted at par. In other directions, Birmingham Wagon rallied strongly from 22s. to 25s. North British Locomotive remained at 4s.

Pressed Steel 5s. shares have fallen from 17s. 4½d. a week ago to 16s. 6d. following the half-yearly statement, but Dowty Group 10s. shares were firmer at 33s. and Leyland Motors steady at 91s. Guest Keen have rallied further from 80s. 6d. to 83s. on the half-yearly statement which indicates that, despite the sharp fall in profits, the 16 per cent dividend total should be maintained. Broom & Wade 5s. shares held steady at 25s. 3d., and on the news of the improved trend in profits, B.I.C.C. strengthened from 57s. 3d. to 58s. In other electricals, G.E.G. improved on balance from 26s. 6d. to 27s. 9d., A.E.I. rose from 31s. 3d. to 34s. and English Electric from 29s. to 31s. Crompton Parkinson 5s. shares firmed from 12s. 9d. to 13s. 1¼d. Stone-Platt shares, however, declined from 41s. 6d. to 39s. 3d½., but Ruston & Hornsby rallied 1s. to 21s. and Tube Investments moved higher at 68s. 3d.

Forthcoming Meetings

Nov. 17 (*Fri.*). Institution of Mechanical Engineers, Enfield Technical College, Queensway, Enfield, at 7.15 p.m. "Recent developments in L.T.E. Railway rolling-stock design," by Mr. G. Styles.

Nov. 17 (*Fri.*). Institute of Transport, East Midlands Section, British Railways School of Transport, Derby, at 6.30 p.m. "A.c. electrification—London Midland Region," by Mr. A. H. Emerson.

Nov. 20 (*Mon.*). Institution of Railway Signal Engineers, Bristol Section, Bristol Temple Meads Station, at 6 p.m. "Testing of panel and relay interlocking schemes," by Mr. W. Claridge.

Nov. 21 (*Tue.*). Industrial Transport Association, London Division, The Royal Society of Arts, John Adam Street, W.C.2, at 6.30 p.m. "Transport of heavy engineering plant for a nuclear power station," by Mr. K. J. McBryde.

Nov. 21 (*Tue.*). Institute of Transport, Metropolitan Graduate and Student Society, 80 Portland Place, W.1, at 6.15 p.m. "Dieselisation on the Great Eastern Line of the Eastern Region," by Mr. P. J. Smith.

Nov. 21 (*Tue.*). Railway Students' Association, the London School of Economics and Political Science (University of London). Visit to Waterloo and Bank Stations (Waterloo & City Railway).

Nov. 22 (*Wed.*). Peterborough Railway Discussion Group, Peterborough Technical College, at 6.45 p.m. "Pullman Car Company," by Mr. F. D. M. Harding.

Nov. 23 (*Thu.*). South Wales & Monmouthshire Railways & Docks Lecture & Debating Society, Dock Manager's Office, Swansea, at 6.45 p.m. "Retrospect, and Prospect" by Mr. P. Morris.

Nov. 23 (*Thu.*). The Permanent Way Institution, Nottingham & Derby Section, Victoria Station Hotel, Nottingham, at 6.30 p.m. "Frictionally controlled buffer stops," by Mr. T. C. Cameron Cooper.

Nov. 23 (*Thurs.*). The Institution of Civil Engineers, Great George Street, S.W.1, at 5.30 p.m. Informal discussion "Freight Handling," introduced by Mr. E. C. Engledew and Mr. R. F. Stoessel.

Nov. 23 (*Thur.*). Institution of Locomotive Engineers, Buckingham Gate, S.W.1, at 5.30 p.m. "Some problems in vehicle riding," by Mr. E. S. Cox.

Feb. 23, 1962 (*Fri.*). Royal Engineers Army Emergency Reserve (Transportation) Annual dinner. Cafe Royal, Regent Street.

OFFICIAL NOTICES

PERSONAL COLUMN LTD., Falcon House, Burnley, Lancs. Pen Friend—all hobbies. Correspondents in almost every country. All ages. S.A.E. for details.

STANDARD Gauge all steel railway wagons, 2 ft. sides, also wagon frames with 2 ft. dia. wheels and axles. Goldendale Iron Co. Ltd., Tunstall, Stoke-on-Trent.

GOVERNMENT OF INDIA, MINISTRY OF RAILWAYS (RAILWAY BOARD)

TENDER No. G.P. 27 of 1961

THE Ministry of Railways propose to obtain from established and reliable manufacturers:—

AUTOMATIC BALLAST TAMPERS—2 Nos.

Tender documents are obtainable from the office of the undersigned, Director General, India Store Department, Government Building, Bromyard Avenue, Acton, London, W.3, and Director, India Supply Mission, 2536, Massachusetts Avenue, N.W. Washington 8, D.C., on payment of Rs. 5.00 (Sh. 7s. 6d.) per set.

Offers should reach the undersigned not later than 12 noon on December 11, 1961.

Director, Railway Stores,
Railway Board, Rail Bhavan,
Raisina Road, New Delhi.

ASSISTANT ENGINEER (MECHANICAL)

REQUIRED by JAMAICA RAILWAY CORPORATION on contract for one tour of two years. Salary £1,900-£2,000 a year according to qualifications and experience. Gratuity at rate of 20 per cent of salary drawn. Free passages. Rent up to £600 a year reimbursed. Liberal leave. Candidates, preferably between the ages 30-35, should be A.M.I.Mech.E. or hold H.N.C. in Mechanical Engineering and have served an apprenticeship. They must have at least five years workshop experience, preferably in locomotive or diesel maintenance or repair and two years experience as Shop or Assistant Manager and be capable of undertaking Mechanical design in rolling stock modifications, etc. Experience with a Home or Overseas Railway an advantage.

Apply to CROWN AGENTS, 4, Millbank, London, S.W.1, for application form and further particulars, stating age, name, brief details of qualifications and experience, and quoting reference M2A/51470/RA.

EAST AFRICAN RAILWAYS AND HARBOURS ADMINISTRATION

Assistant Mechanical Engineer

Qualifications and Duties: Candidates preferably aged 26-45 years must have passed, or be exempt from Sections A and B of the examination for Associate Membership of the Institution of Mechanical Engineers. They must have served a full apprenticeship or cadetship with a British owned railway or a firm of locomotive builders or diesel engine builders of repute, followed by at least four years' experience in steam or diesel locomotive operation and maintenance, or with a firm of diesel engine builders or operators, during the whole or part of which period they must have held a post of some responsibility in the Mechanical Department of such railway or firm.

Terms. On contract for one tour of 24 months in the first instance.

Total Emoluments (including gratuity) in scale £2,040-£3,090 per annum.

Education Allowances: Up to £200 p.a. per child.

Free passages. Free medical attention.

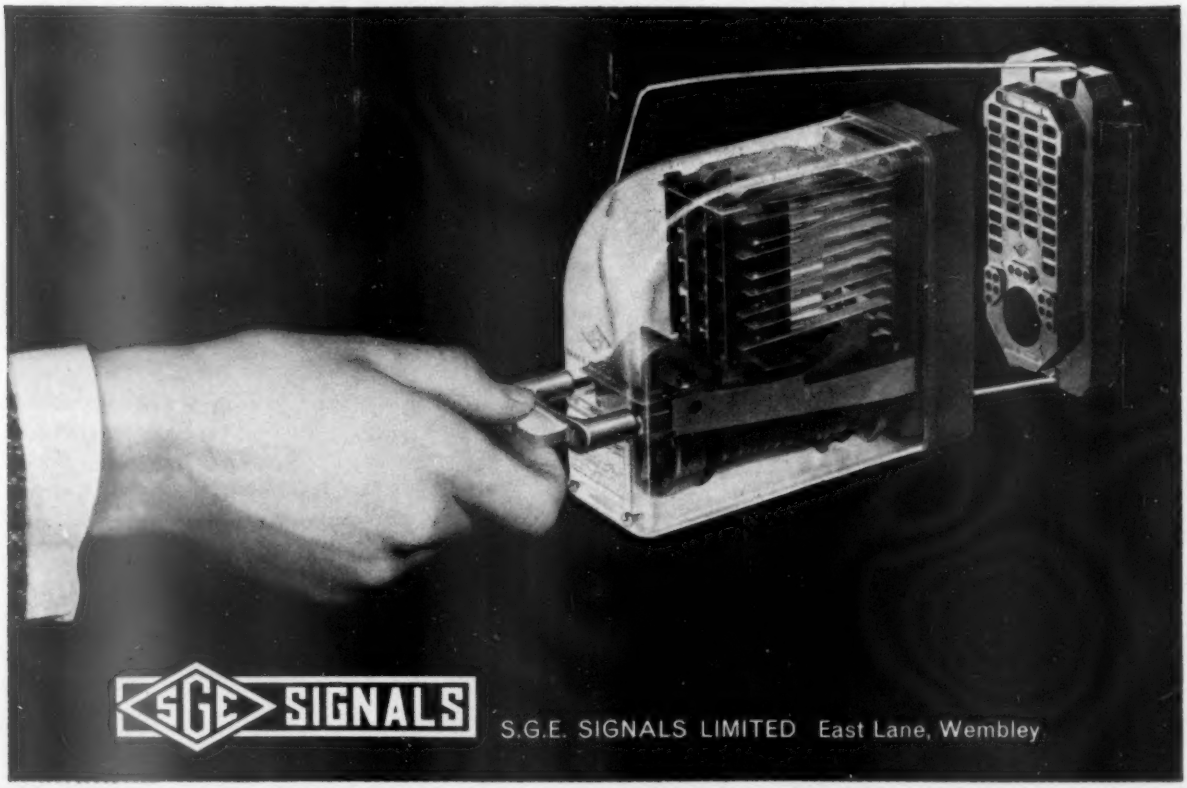
Write Director of Recruitment, Department of Technical Co-operation, Carlton House Terrace, London, S.W.1, quoting RC 299/04/D15 giving full name, age and brief details of qualifications and experience.

new developments in signalling by S.G.E.

miniature plug-in relays

TO AN ENTIRELY NEW SPECIFICATION

For many years S.G.E. has actively pursued the policy of reducing the size and cost of railway signalling equipment. Now a new range of miniature plug-in relays has been successfully developed and is already being widely adopted by British Railways and by overseas users. Each of these relays occupies only about a quarter of the space required for the former standard size and the weight is reduced in the same proportion. The cost of relay rooms and location cases will thus be greatly reduced and the increased number of contacts available on these relays and the lower initial cost will further cut down the expense of modern relay interlocking control systems. Miniaturisation is but one aspect of a large scale research and development programme being carried out by S.G.E. which will make many important contributions to the modernisation of railway Signalling. Today S.G.E. can meet all railway signalling needs and will be ready tomorrow with new, better, quicker and safer apparatus and techniques to take care of the future.



Curtain up on a versatile performer!

Presenting John Bull, the power unit with a wide repertoire of tough railway track maintenance work. With one assistant and the minimum of props it gives a performance that's a joy to watch.
An established star with British Railways, it tops the bill—and fits the bill—every time.

SAWING—
clean through a 113 lb. flat bottom rail in 12 minutes. Between thirty and forty 113 lb. rails can be cut in one day by one operator. Cuts are smooth-faced and accurate to within 1/10".

BORING—
holes through any sleeper in 4 to 10 seconds, according to thickness. Coach screws driven home to exact tightness required in same time. Special adjustable slipping clutch eliminates over-tightening and damage to wooden ferrules.

DRILLING—
a 1⅛" dia. hole through a 95 lb. Bull Head Carbon Rail in 60 seconds. Needs only one operator. Costs only a few shillings a day to run. Special jig plates supplied with clamp ensure accurately placed cleanly cut holes.

GRINDING—
or scratch-brushing rust from all structural work. Only one operator.

Simple to operate, light to carry, completely portable. And the high speed gearbox cuts labour costs.

JOHN BULL

PETROL DRIVEN RAILWAY TRACK MAINTENANCE EQUIPMENT

For further details of this all-star equipment, write to:—

HOWARD PNEUMATIC ENGINEERING CO. LTD., FORT ROAD, EASTBOURNE
TELEPHONE: EASTBOURNE 4804-5 · TELEGRAMS AND CABLES: HOWATIC, EASTBOURNE

ELECTRIFICATION on the FRENCH RAILWAYS

★

120 MORE MILES ELECTRIFIED IN 1961

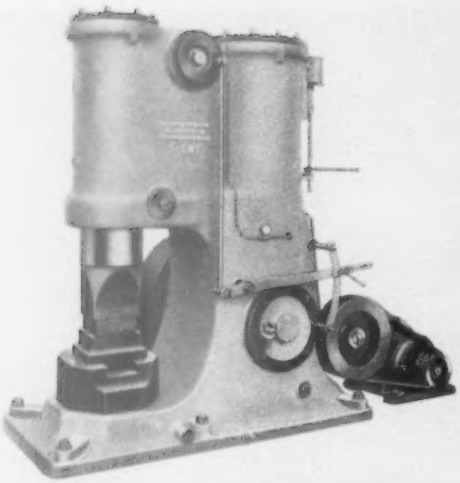
AT883A

..but more chocolate is carried by British Railways

Thousands of tons of chocolate travel by train. Every night many hundreds of wagons leave chocolate factories up and down the country and are speeded on their way to the shops or for export by British Railways Express Freight Services. A lot of the chocolate goes to stores specially provided at or near the stations where it is held available in perfect condition for immediate distribution. There are more than 800 Express Freight trains time-tabled every weekday, many giving next morning arrivals over long distances. From many towns British Railways Export Express services give assured next-morning delivery for wagon load traffic to London Docks (Royal, India and Millwall Groups), Merseyside, Manchester, Goole, Grimsby, Hull, Southampton, Glasgow and Grangemouth. Charges are fully competitive: ask your Goods Agent for details.

BRITISH RAILWAYS

MODERN FREIGHT SERVICES



PROVED BY PERFORMANCE

The essential features of a Power Hammer are—

Reliability of Action
Simplicity of Construction
Ease of Control
Economy in power consumption

That the P.B. Hammer meets these conditions is shown by the large numbers in use in all parts of the world and proves them suitable for the most arduous conditions.

Available in sizes ½ to 7 cwt. they are usually supplied as self-contained motor-driven units.

Some of our other products include

★ FANS. Light and Heavy Duty for all purposes.

★ BLOWERS. Positive displacement design of the Roots and Sliding Vane designs for all purposes.

★ SMITHY EQUIPMENT.

★ FOUNDRY EQUIPMENT.

ALLDAYS & ONIONS
LIMITED

GREAT WESTERN WORKS • BIRMINGHAM 11 • Telephone: VICtoria 2251-4
London Office: 2 Queen Anne's Gate • Westminster, S.W.1 • Telephone: WHItehall 1923-4-5

Sylrust

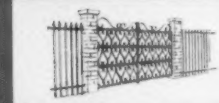
A PRIMER FOR *RUSTED* SURFACES

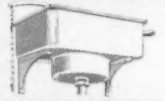
Now you can paint rusted metal-work **WITHOUT** the rust coming through

Covers twice the area of paint

Available in Red or Aluminium

Prices:
Nominal ½ Pint tins 6/-
,, 1 Pint tins 10/6
,, 1 Gal. cans 70/-





Available from Ironmongers and Builders' Merchants

THE SYLGLAS COMPANY
81 Knight's Hill, London S.E.27 Telephone: GIPsy Hill 7511 (10 lines)

Behind all ESCO Products—

✳ *Send for booklet 'The Lining of Bearings', and technical Data sheets*

Esco Products include:

Tandem White Metals and Bearings complete or relined.
Gun Metal & Phosphor Bronze Chill Cast Rods and Ingots.
T.C.C. Continuous Cast Phosphor Bronze Rods.
Rotocast Bronze Bushes and Blanks.

THE **EYRE** SMELTING COMPANY LIMITED

RESEARCH GROUP MEMBERS THE ASSOCIATION OF ABBF BRONZE & BRASS FOUNDERS

TANDEM WORKS, MERTON ABBEY, S.W.19 · Telephone MITCHAM 2031

LEH
DESIGNERS AND MANUFACTURERS OF HYDRAULIC EQUIPMENT

WHEEL PRESS

Robustly built on a fabricated steel frame of great strength but minimum weight, the machine illustrated is typical of the efficient and reliable special purpose presses which The Leeds Engineering and Hydraulic Co. Ltd., develop and manufacture to customers requirements.

THE LEEDS ENGINEERING & HYDRAULIC CO. LTD.,
RODLEY, LEEDS.
Tel. Pudsey 2859. Grams, "Pumps" Rodley

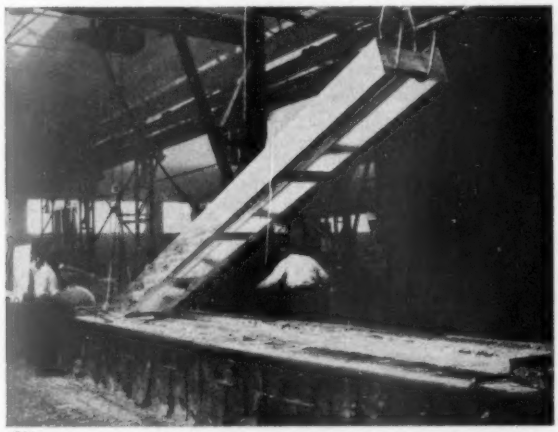
LA

Fighting Corrosion

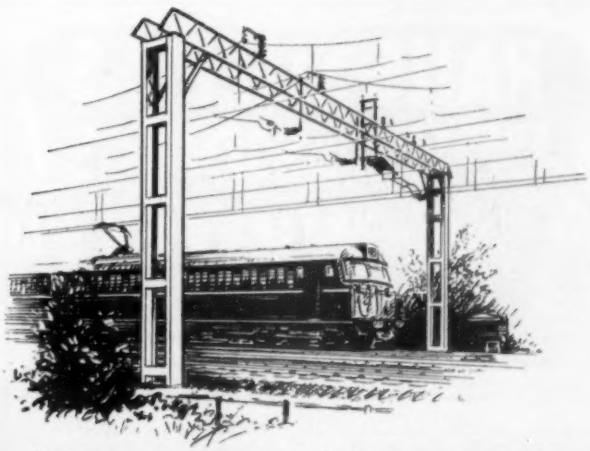
Tenacious and durable, hot galvanizing is still the most effective and most economical means of combating rust.

As pioneers of hot-dip galvanizing Harveys have exceptional facilities for its application, including baths 15 ft. x 7 ft. x 5 ft. 9 in. deep and 30 ft. x 3 ft. x 5 ft. 6 in. deep.

Gantries for B.R. Electrification Scheme. Fabricated by Redpath Brown & Co. Ltd. for B.I.C.C.



G/4



HOT-DIP GALVANIZING
by the 'Harco' Process

Harvey Products and Services include:
WELDED PRESSURE VESSELS · FABRICATIONS UP TO 120 TONS HEAVY MACHINING AND FITTING · STEEL PLATE AND SHEET METAL WORK · PERFORATED METALS · WOVEN WIRE WIREWORK · STORAGE EQUIPMENT · OFFICE FURNITURE IN STEEL

HARVEY

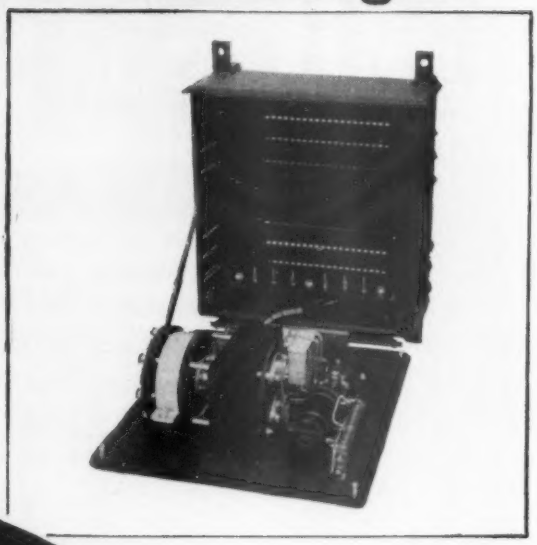
G. A. HARVEY & CO. (LONDON) LTD.
Woolwich Road, London, S.E.7 GREenwich 3232

Why will NBD dive with Dreadnought?

Amongst the vast array of modern equipment in Dreadnought's hull will be an NBD Voltage Regulator controlling vital electrical equipment.

When Britain's first nuclear submarine makes her maiden voyage, NBD will be there.

- Servo Motors
- Transistor Convertors
- Motor Generator Sets
- Automatic Voltage Regulators
- Rotary Transformers and Convertors
- High Frequency Alternators (400 to 3,000 c.p.s.)
- Permanent Magnet Alternators

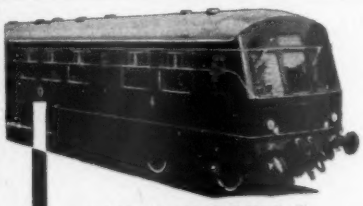


NEWTON BROS. (DERBY) LIMITED, ALFRETON ROAD, DERBY.

Telephone: Derby 47676 (4 lines). Grams: DYNAMO DERBY.
London Office: IMPERIAL BUILDINGS, 56 KINGSWAY, W.C.2.

RAILS·SLEEPERS
EVERYTHING FOR SIDINGS
Write to WHITES *Estd. 1869*
of Widnes

R. WHITE & SONS (Engineers) LTD., P.O. BOX 2, WIDNES, LANCS.
Telegrams : "RAILS, WIDNES". *Telephone :* WIDNES 2425 (Three lines)



TEARNE'S TRANSFERS

You can always depend upon "TEARNE" TRANSFERS to give entire satisfaction—they are BRITISH throughout, produced by the ORIGINAL manufacturers of Transfers for Railway Carriages, Locomotives, Omnibuses, etc. ARMS, MONOGRAMS, LETTERING. Every description of inside and outside Ornamentation for applying to Metal, Wood, Glass, etc.

TEARNE & SONS, LTD. All Saints Road, Birmingham, 18.
Phone : Northern 1637 *Grams : "Tearne, Birmingham"*
ESTABLISHED OVER 100 YEARS

PROVIDENT MUTUAL
LIFE ASSURANCE ASSOCIATION
(FOUNDED 1840)

FUNDS . . £25,000,000

The PROVIDENT MUTUAL is a mutual and co-operative Association, the business being conducted solely for the benefit of the Policy Holders.
Life and Endowment Assurance to suit every requirement, including HOUSE PURCHASE. Premiums deducted through the paysheets.

Apply for particulars to:

J. M. ROBERTSON, Managing Director, 25-31, Moorgate, London, E.C.2.

MODERNIZATION
OF BRITISH RAILWAYS

Photograph by courtesy of British United Traction Limited

ONE OF THE AUTOMOTIVE PRODUCTS GROUP

ASSISTED BY

PUROLATOR REGD. TRADE MARK

THE PIONEERS OF IMPREGNATED PAPER FILTERS

AUTOMOTIVE PRODUCTS COMPANY LTD · LEAMINGTON SPA · WARWICKSHIRE · ENGLAND

THE TRAIN NEXT WHEN AND WHERE TO

Confusion of crowds? Not with Setright! A Setright Automatic Display Indicator helps you pass vital information to your public quickly, clearly, and without trouble. Good reasons why more and more Setright Indicators are seen every day.

- **Easily seen in daylight or artificial light.**
- **Simple remote control operation.**
- **Quality construction for long trouble-free life.**
- **All sizes available for single or multiple boards.**

KEEP THE PUBLIC IN THE PICTURE WITH SETRIGHT

For full information write to:

SETRIGHT REGISTERS LIMITED

EASTWAY WORKS, EASTWAY, HACKNEY WICK, LONDON, E.9 Tel: AMHerst 7186

INDEX TO ADVERTISEMENTS

Aberdare Cables Ltd. ... —
Abingdon King Dick, Ltd. —
Abtus, Ltd. —
Aircraft Marine Products (Gt. Britain), Ltd. —
Alfloc Water Treatments Service 36
Alldays & Onions, Ltd. ... 50
Allen, Edgar, & Co. Ltd.... 46
Allgemeine Elektricitats Gesellschaft ... 25
Armstrong Patents Co., Ltd. —
Asquith, Wm., Ltd. ... —
Associated British Machine Tool Makers, Ltd. ... 45
Associated Electrical Industries—GRS, Ltd. ... 56
Associated Electrical Industries (Manchester), Ltd.... 14
Associated Electrical Industries (Rugby), Ltd. —
Associated Lead Manufacturers, Ltd. ... ... —
Auster, Ltd. —
Austin Taylor Electrical, Ltd. ... ... —
Automotive Products Co., Ltd. 53

Baker, John, & Bessemer, Ltd. ... ... —
Bayliss, Jones & Bayliss, Ltd. —
Beckett, Laycock & Watkinson, Ltd. ... —
Belships Co., Ltd., Skibs A/S 4
B.E.N. Patents, Ltd. —
Beresford, James & Son Ltd. —
Berry, Henry, & Co., Ltd.... —
Beyer, Peacock Ltd. ... —
Beyer, Peacock, Gorton Ltd. ... ... —
Beyer, Peacock (Hymek), Ltd. ... ... —
Beyer, Peacock, Railway Equipment, Ltd. —
Bintex, Ltd.... ... ... —
Birfield Industries, Ltd. —
Birkett, T. M. Billington & Newton, Ltd. ... —
Birmingham Railway Carriage & Wagon Co., Ltd. —
Bolton, Thos., & Sons, Ltd. —
Bonded Laminates, Ltd. —
Booth, James, Aluminium Ltd. 7
Bowmaker (Plant), Ltd. ... —
Boydell, E., & Co., Ltd. —
B.P. Trading Ltd. ... —
Bristol Siddeley Engines, Ltd. —
Britannia Batteries, Ltd. ... —
British Electrical Repairs, Ltd. ... ... —
British Ermeto Corp., Ltd. —
British Insulated Callender's Cables, Ltd. ... —
British Insulated Callender's Construction Co., Ltd. ... —
British Oxygen Co., Ltd. ... —
British Oxygen Gases, Ltd. —
British Paints, Ltd. ... —
British Railways 49
British Timken Division of The Timken Roller Bearing Company —
British United Traction, Ltd. —
Bromsregulator Svenska Akt. —
Brown Bayley Steels, Ltd.... —
Brush Traction, Ltd. ... —
B.T.R. Industries, Ltd. ... —
Buff, John, Rubber Co., Ltd. —
Bullers, Ltd. 28
Butler Machine Tool Co., Ltd. 45

Caterpillar Tractor Co., Ltd. —
C.A.V., Ltd. ... ... —
Chapman, A. W., Ltd. ... —
Chipman Chemical Co., Ltd. —
Churchill Machine Tool Co., Ltd. ... ... —
Clayton-Wright, Howard, Ltd. ... ... —
Cleveland Bridge & Engineering Co., Ltd. ... —
Clyde Rubber Works Co., Ltd. ... ... —
Cobra (Wood Treatment), Ltd. ... ... —
Cockerill, S. A., Ougree ... —
Colvilles, Ltd. ... ... —
Commonwealth Sales Corporation ... ... —
Consolidated Pneumatic Tool Co., Ltd. ... ... —
Conveyancer Fork Trucks Ltd. ... ... —
Cooper, Geo., & Sons ... —
Coventry Machine Tool Works, Ltd. ... ... —
Cowans, Sheldon & Co., Ltd. 18
Craven Bros. (Manchester), Ltd. ... ... —
Cravens Limited 13
Crompton Parkinson, Ltd. —

Davey, Paxman & Co., Ltd. —
Davies & Metcalfe, Ltd. 43
Dixon Corbitt Ltd. ... —
Docker Brothers 12
Dorman Long (Africa) Ltd. —
Drewry Car Co. Ltd. ... —
Drummond Asquith, Ltd. —
Du Pont (United Kingdom), Ltd. ... ... —

Fagre Construction Co., Ltd. —
Elastic Rail Spike Co., Ltd. —
English Electric Co., Ltd. 20, 21
English Steel Corporation, Ltd. ... ... —
E.N.V. Engineering Co. Ltd. —
Ericssons Signalaktiebolag, L.M. ... ... —
Eutectic Welding Alloys Co., Ltd. ... ... —
Expanded Rubber Co., Ltd. —
Eyre Smelting Co., Ltd. ... 50

F.A.G. Bearing Co., Ltd. ... —
Fairclough, Leonard, Ltd.... —
Falk, Stadelmann & Co., Ltd. —
Fawcett, Preston & Co. Ltd. —
Ferguson Battery Co., Ltd. —
Ferodo, Ltd. ... ... —
Fibreglass Ltd. ... ... —
Finlay Engineering, Ltd. ... —
Fisons Pest Control Ltd. ... —
Flextol Engineering Co., Ltd. ... ... —
Fowler, John, & Co. (Leeds), Ltd. 5
French Railways 48

Ganz-Mavag ... ... —
General Electric Co., International ... ... —
General Electric Co., Ltd. 34, 35
General Motors Overseas Operations 19
General Steel Industries Inc. —
Glacier Metal Co., Ltd. ... —
Gloucester Railway Carriage & Wagon Co., Ltd. —
Godwin Warren (Engineering), Ltd. ... ... —
Greenwood's & Airvac Ventilating Co., Ltd. ... —
Gresham & Craven, Ltd. ... —
Griffiths Bros. & Co. London, Ltd. ... ... —
Grover & Co., Ltd. ... —

Hackbridge & Hewittic Electric Co., Ltd. ... 38
Hackbridge Cable Co., Ltd. —
Hadfields, Ltd. ... ... —
Hardy Spicer, Ltd. ... ... —
Harper, John, & Co., Ltd. —
Harvey, G. A., & Co. (London), Ltd. 51
Hasler Telegraph Works, Ltd. ... ... —
Henderson & Keay, Ltd. ... —
Henschel Werke, G.m.b.H. —
Hitachi, Ltd. ... ... —
Hoffmann Manufacturing Co., Ltd. ... ... —
Holman Bros. & Co., Ltd. —
Howard Pneumatic Engineering Co., Ltd. 48
Hudswell Clarke & Co. Ltd. —
Hunslet Engine Co., Ltd. 27
Hyde, Robert, & Son, Ltd. 11
Hymatic Engineering Co. Ltd. ... ... —

Illingworth, E., & Co., Ltd. —
Imperial Aluminium Co., Ltd. ... ... —
Imperial Chemical Industries, Ltd. ... 36, 39
Intermit Ltd. ... ... —
International Twist Drill Co. Ltd. ... ... —
Isca Foundry, Ltd.... ... —
Isothermos, Société Internationale des Applications —

Jackson Vibrators, Inc. ... —

Kaye, Joseph, & Sons, Ltd. —
Kearns, H. W., & Co., Ltd. —
Kearsley, Robert, & Co. ... —
Kendall & Gent, Ltd. ... —
Kenitra Co., Ltd. ... ... —
King, George W., Ltd. ... 32
Kisha Seizo Kaisha, Ltd. ... —
Kitchen & Wade, Ltd. ... —
Klockner-Humboldt-Deutz, A.G. ... ... —
Krauss, Maffei A.G. ... —
Krupp, Fried, Maschinenfabriken 33
Kyosan Electric Mfg. Co., Ltd. ... ... —

Lace Web Spring Co., Ltd. —
Lamp Manufacturing & Railway Supplies, Ltd. ... —
Lang, John, & Sons, Ltd.... —
Lamigraph Ltd. ... ... —
Lansing Bagnall, Ltd. ... —
Laycock Engineering, Ltd. —
Le Carbone (Great Britain), Ltd. ... ... —
Leeds Engineering & Hydraulic Co., Ltd. ... 51
Levick, John, Ltd. ... —
Levs' Malleable Castings Co. Ltd. ... ... —
Lifting Gear Products (Engineering), Ltd. ... ... —
Lockheed Precision Products Ltd. ... ... —
Lockspike, Ltd. ... ... —
Londex Ltd. ... ... —
London Transport Executive —
Luwa, G.m.b.H. ... ... —

Macdonald, John, & Co., (Pneumatic Tools), Ltd.... —
Marconi's Wireless Telegraph Co., Ltd. ... ... —
Marcroft Wagons, Ltd. ... —
Marsden, Samuel, & Son, Ltd. ... ... —
Marston Excelsior, Ltd. ... 39
Maschinenfabrik Augsburg-Nurnberg, A.G. ... —
Massey, B. & S., Ltd. ... —
Matisa Equipment, Ltd. ... —
Maus, J.M.J., Ltd. ... 33
Metalastik, Ltd. ... ... —
Metallic Seamless Tube Co., Ltd. ... ... —
Metropolitan-Cammell Carriage & Wagon Co., Ltd. 2
Mills, The Exors. of James, Ltd. ... ... —
Miner, W. H., Inc.... ... —
Mirrlees, Bickerton & Day, Ltd. 40
Mitchell, Shackleton & Co., Ltd. ... ... —
Morganite Carbon, Ltd. ... —
Murex Welding Processes, Ltd. ... ... —

National Provincial Bank —
Neal, R. H., & Co., Ltd. ... —
Newton Bros. (Derby), Ltd. 52
Nife Batteries, Ltd.... ... —
Nippon Signal Co., Ltd. ... —
North Bar Tool Co., Ltd.... —
North British Locomotive Co., Ltd. ... ... —
Nuts & Bolts (Darlaston), Ltd. ... ... —

Oleo, Pneumatics, Ltd. ... 26
Ormerod Shapers, Ltd. ... —
Osborn, Samuel, & Co., Ltd. —
Ottermill Switchgear, Ltd.... —

P. & M. Co. (England), Ltd. 10
Palnut Co., Ltd., The ... —
Parkinson Cowan Industrial Products, Ltd. ... ... —
Parkinson, J., & Son (Shipley), Ltd.... ... ... —
Paterson Hughes Engineering Co., Ltd. ... ... —
Pearson Machine Tool Co., Ltd. ... ... —
Pel, Ltd. ... ... —
Permali, Ltd. ... ... —
Peters, G. D., & Co. Ltd. ... —
Philplug Ltd. 24
Pirelli-General Cable Works, Ltd. ... ... —
Planwell Engineering Co., Ltd. ... ... —
Plasser Railway Machinery (G.B.), Ltd. ... ... —
Plasser & Theurer ... ... —
Portasilo Ltd. ... ... —
Powell Duffryn Engineering Co., Ltd. 31
Pressed Steel Co., Ltd. ... —
Provident Mutual Life Assurance Association ... 52

Railko Ltd. ... ... —
Railway Signal Co., Ltd. ... —
Ransomes & Rapier, Ltd.... 1
Rawlings Manufacturing Co., Ltd. ... ... —
Regent Oil Co. Ltd. ... —
Reyrolle, A., & Co., Ltd. ... —
Rheinstahl Siegener Eisenbahnbedarf, A.G. ... —
Richards, Chas., & Sons, Ltd. ... ... —
Roberts, Charles, & Co., Ltd. ... ... —
Roberts, J. W., Ltd. ... 42
Rolls-Royce, Ltd. 30
Rozalex, Ltd. ... ... —
Ruston & Hornsby Ltd. ... —

Saunders Valve Co., Ltd. ... —
Scammell Lorries, Ltd. ... —
Scaw Mill Ltd. ... ... —
Schindler Carriage & Wagon Co., Ltd. ... ... —
Scottish Machine Tool Corporation, Ltd. ... —
Setright Registers, Ltd. ... 53
S.G.E. Signals Ltd. ... 47
Sheffield Twist Drill & Steel Co., Ltd. 55
Siebe Gorman & Co., Ltd. —
Siemens & Halske, Akt. ... —
Silentbloc, Ltd. 15
Simmonds Aerocessories, Ltd. ... ... —
Simmonds & Stokes (Niphan), Ltd. ... ... —
Simon Engineering Dudley, Ltd. ... ... —
Skefko Ball Bearing Co., Ltd. ... ... —
Smith's Industrial Instruments, Ltd. ... ... —
Smith, John (Keighley), Ltd. —
Smith, Thos., & Sons (Rodley), Ltd. ... ... —
Smith, W., Gilmour & Co., Ltd. ... ... —
Southern Forge Co., Ltd.... —
South Wales Switchgear Co., Ltd. 9

S.P.E. Co., Ltd. ... ... —
Spencer Moulton, George, & Co., Ltd. ... —
Standard Telephones & Cables, Ltd. 23
Steel Coy. of Wales, Ltd. ... —
Steel, Peech & Tozer —
Steels Engineering Products, Ltd. ... ... —
Stirk, John, & Sons, Ltd. ... —
Stone, J., & Co. (Deptford), Ltd. ... ... —
Stream Line Filters, Ltd. ... —
Suffolk Iron Foundry (1920), Ltd. ... ... —
Sulzer Bros. (London), Ltd. —
Summerson, Thos., & Sons, Ltd. ... ... —
Swiss Car & Elevator Mfg. Corp., Ltd. ... ... —
Swiss Industrial Company ... —
Swiss Locomotive & Machine Works ... ... —
Sylglas Company The ... 50

Talbot Waggonfabrik ... —
Tangyes, Ltd. 16
Tarmac Roadstone Ltd. ... —
Taylor Bros. & Co., Ltd. ... —
Taylor Bros. (Sandiacre), Ltd. ... ... —
Taylor, F. & Sons (Manchester), Ltd. 41
Taylor Rustless Fittings Co., Ltd. ... ... —
Tearne & Sons, Ltd. ... 52
Tees Side Bridge & Engineering Works, Ltd. ... —
Telephone Manufacturing Co., Ltd. ... ... —
Tempered Rubber Components Ltd. ... ... —
Tempered Spring Co., Ltd. —
Thermit Welding (Gt. Britain) Ltd. ... ... —
Thomas, Richard, & Baldwins, Ltd. ... ... —
Thompson, John, Motor Pressing Ltd. ... ... —
Thomson, Thomas, Sons & Co. (Barrhead), Ltd. ... —
Toledo Woodhead (Sheffield), Ltd. ... ... —
Town, Fredk., & Sons, Ltd. 6
Transport Brakes, Ltd. ... —
Transport Engineering & Equipment, Ltd. ... ... —
Trico-Folberth, Ltd. ... 22
Triplex Safety Glass Co., Ltd. —
Tulloch, Ltd. ... ... —
Turton, Geo., Platts & Co., Ltd. ... ... —
Turton, Thos. & Sons, Ltd. —
Tyer & Co., Ltd. ... —

United Steel Companies, Ltd. ... ... —

Vacu-Blast, Ltd. 8
Vacuum Brake Co., Ltd. ... —
Vandervell Products Ltd, ... —
Vokes, Ltd. ... ... —
Vulcanised Fibre, Ltd. ... —

Walker, James, & Co., Ltd. —
Ward, H. W., & Co., Ltd.... —
Ward, Thos., W., Ltd. ... 6
Werkspoor, N.V. 29
Westinghouse Brake & Signal Co., Ltd. ... 3
White, R., & Sons (Engineers), Ltd. 52
Wickham, D., & Co., Ltd.... 37
Wild, A. G., & Co., Ltd. ... 17
Williams, Henry, Ltd. ... —
Winn & Coales, Ltd. ... —
Workington Iron & Steel Co. —
Wright Anderson & Co., Ltd. ... ... —
Wynn-Williams, Llewelyn, Ltd. ... ... —

Zwicky, Ltd. ... ... —

LONDON: Printed by ODHAMS PRESS LTD., Long Acre, W.C.2, and Published by TOTHILL PRESS LIMITED, Proprietors of THE RAILWAY GAZETTE, at 33, Tothill Street, Westminster, S.W.1. November 17, 1961

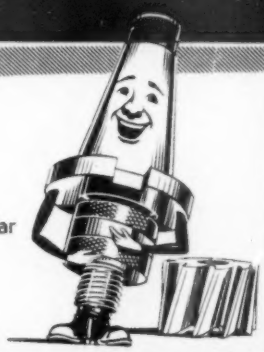
Screw-locked milling... AT ITS SIMPLEST & MOST EFFICIENT

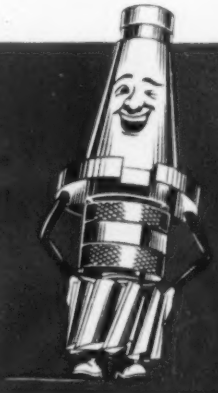
DORMER HELI-MATIC ARBORS AND SCREWED BORE CUTTERS

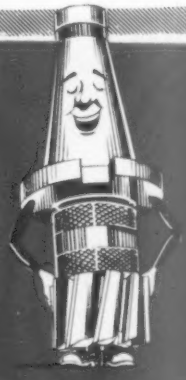
This high-efficiency combination simplifies screw-locked milling and achieves the greatest productivity. Ease of assembly, precision in performance, and duration of working life are the outstanding features of the Heli-matic equipment.

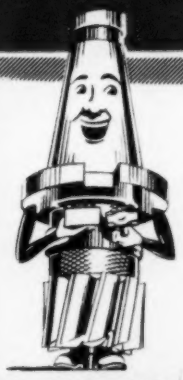
FIRST STAGE

Screw on the nut by hand—as far as it will go.









TO RELEASE

Apply the spanner to the nut and a few sharp hammer blows will release the nut from the cutter, which can then be screwed off by hand."

You can't go wrong—send for the Heli-matic brochure giving full range of Arbors and Cutters.

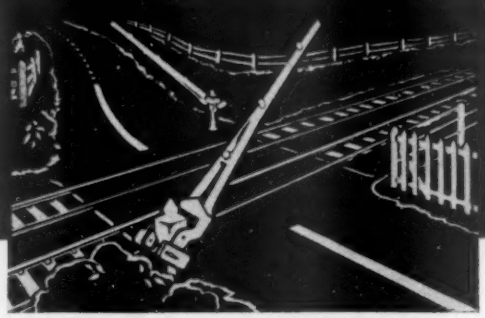
DORMER

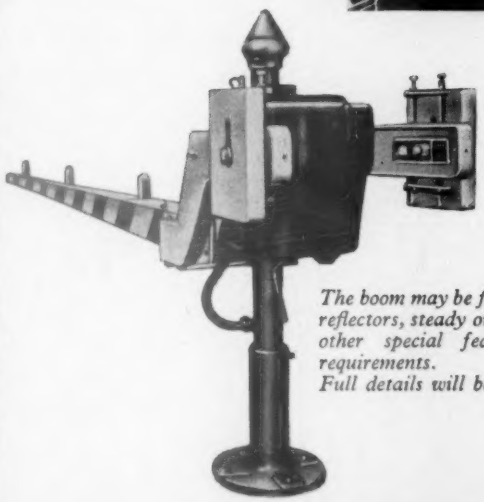
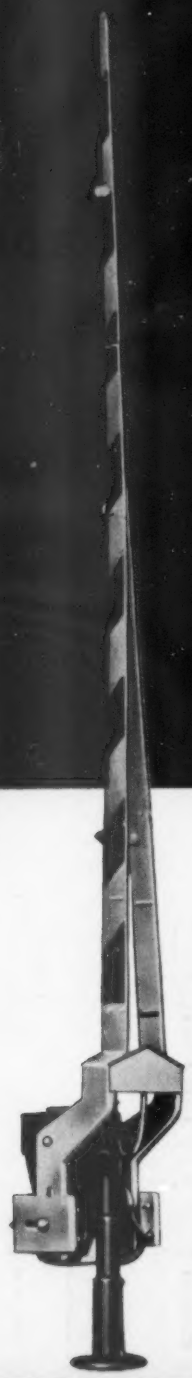
Heli-matic

THE SHEFFIELD TWIST DRILL AND STEEL COMPANY LIMITED
SHEFFIELD **ENGLAND**

DORMER TOOLS ARE OBTAINABLE FROM YOUR USUAL ENGINEERS' MERCHANTS

TRAFFIC BARRIER





The boom may be fitted with pendant fringe, red reflectors, steady or flashing red lights, and any other special features to meet individual requirements.
Full details will be gladly supplied on request.